JOURNAL

OF THE

FRANKLIN INSTITUTE

OF THE

State of Pennsylvania,

DEVOTED TO THE

MECHANIC ARTS, MANUFACTURES, GENERAL SCIENCE,

AND THE RECORDING OF

AMERICAN AND OTHER PATENTED INVENTIONS.

APRIL, 1833.

FOR THE JOURNAL OF THE FRANKLIN INSTITUTE.

Prof. Daniell's Oxy-hydrogen Jet, previously invented and described by Prof. Hare.

TO THE COMMITTEE ON PUBLICATIONS.

GENTLEMEN,—The article of your correspondent, who claims for Professor Hare the invention of his compound blow-pipe, had scarcely appeared, before the number of the London and Edinburgh Journal of Science, subsequent to that to which he refers, reached me, containing, from a high source, viz. Prof. Daniell, of King's College, London, a description of a "new oxy-hydrogen jet." The principle of this jet was clearly explained by Prof. Hare in his paper on the hydrostatic blow-pipe, republished in the 14th volume of Tilloch's Philosophical Magazine; and a more perfect, though a more complex jet, upon the same principle, is figured and described in Hare's Chemical Compendium, published in 1828, the jet having been made as early as 1817.

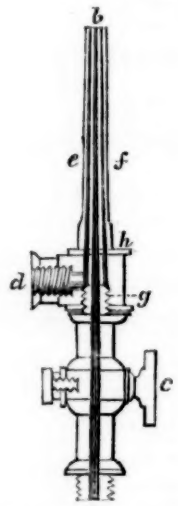
In order to prove these allegations, and to show that Prof. Daniell is only the second inventor of this "new oxy-hydrogen jet," I propose to give you, from the Journal of Science, the description and accompanying sectional figure of the jet; to be followed by the figure and description of that published by Dr. Hare in 1802, and by the more complete execution of the same idea figured and described in his Chemical Compendium.

In thus doing I disclaim any intention to cast a suspicion upon

the fairness of Prof. Daniell; he will, I feel pursuaded, acknowledge that he has been anticipated in this effort of his mechanical skill; my object is to show that this ingenious adaptation of parts in the jet of the compound blow-pipe, belongs to the original inventor of that instrument—to Professor Hare.

Extract from an article entitled "*On a new Oxy-hydrogen Jet, by* J. F. DANIELL, *Esq., Prof. Chem. King's College, London.*" London and Edinburgh Journal of Science, and Philosophical Magazine, for January, 1833.

Description of the Jet.



"*a b* is a jet of brass, to be connected, by means of the stopcock *c*, and a flexible leaden pipe, with a gas-holder of oxygen gas. This is fixed by means of a screw, *g*, in the centre of another jet, *e f*, and connected by means of the lateral arm and screw *d*, with another gas-holder of hydrogen gas, or with what is better still, the pipe of a coal gas burner. The second jet thus forms an exterior coating to this first; and when the inflammable gas flows through it, and is ignited at the orifice, a stream of oxygen may be directed into the interior of the flame by means of the latter, with any required degree of force."

I proceed to show that this principle was entirely anticipated in a form of jet used by Dr. Hare prior to 1802, an account of which was given in his "*Memoir on the supply and application of the Blow-pipe;*" read before the Chemical Society of Philadelphia, and published by their order.

Extract from Tilloch's Philosophical Magazine, Lond. vol. xiv. *p.* 303.

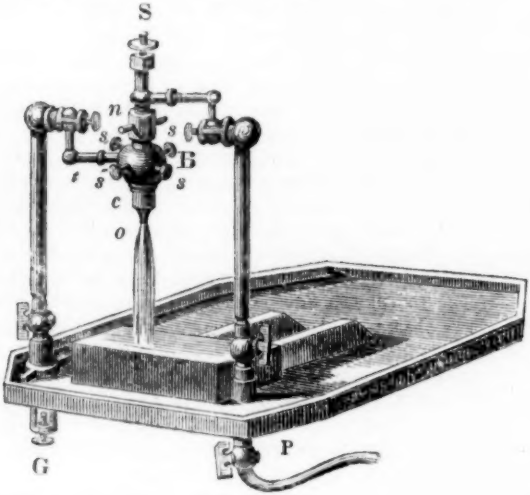
"At *f* are represented pipes which are used for the fusion of platina, or subjects of the largest kind. They consist of a large and a small pipe, the orifice of the one being inserted into that of the other, as may be understood from the dotted line near *f*."

The more perfect form of this jet, the principle remaining the same, is figured on the next page. The view of the entire blow-pipe apparatus, and the description, are taken from Hare's Chemical Compendium, (1828,) page 77. A sectional view of the jet is added, that

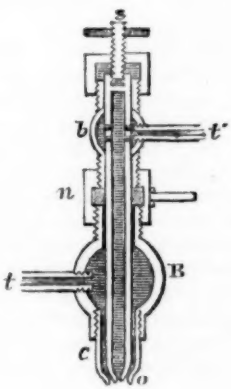
its structure may more plainly appear, and the similarity of that of Prof. Daniell to it, be more readily observed.

"*Engraving and description of an improved Compound Blow-pipe and its appendages.*"

"The following figure represents a compound blow-pipe which I contrived and executed myself, about eleven years ago; but, fearing it might be deemed unnecessarily complex, I did not then publish an account of it. Experience has shown, that the complication of its structure does not render it more difficult to use, than the simplest instruments intended for the same purpose; while its parts are peculiarly susceptible of advantageous adjustment.



B, is a brass ball with a vertical perforation, terminating in a male screw above, and in a female screw below. Another perforation, at right angles to this, causes a communication with the tube *t*, which enters the ball at right angles. A similar, but smaller brass ball, may be observed above, with perforations similar to those in the larger ball, and a tube, in like manner, entering it laterally. This ball terminates in a male screw below as well as above. The thread of the lower screw is curved to the left, while that of the screw of



the larger ball, which enters, the same nut, *n*, is curved to the right. Hence the same motion causes the male screws to approach, or recede from, each other, and thus determines the degree of compression given to a cork which is placed between them, in the nut. At S, above the ball, a small screw may be observed, with a milled head. This is connected with a small tube which passes through the cork in the nut, and reaches nearly to the external orifice, *o*, from which the flame is represented as proceeding. This tube is for the most part of brass, but at its lower end terminates in a tube of platina. It communicates by lateral apertures with the cavity of the upper ball, but is prevented by the cork from communicating with the cavity in the other ball. Hence it receives any gas which may be delivered into the upper ball from the lateral pipe which enters that ball, but receives none of the gas which may enter the lower ball, B.

"Into the female screw of the latter, a perforated cylinder of brass, *c*, with a corresponding male screw, is fitted. The perforation in this cylinder forms a continuation of that in the ball, but narrows below, and ends in a small hollow cylinder of platina, which forms the external orifice of the blow-pipe *o*.

"The screws *s s s s*, are to keep, in the axis of the larger ball, the tube which passes through it, from the cavity of the smaller ball. The intermediate nut, by compressing about the tube, the cork which surrounds it, prevents any communication between the cavities in the two balls. By the screw, *S*, in the vertex, the orifice of the central tube may be adjusted to a proper distance from the external orifice. Three different cylinders, and as many central tubes, with platina orifices of different calibres, were provided, so that the flame might be varied in size, agreeably to the object in view.

"I have always deemed it best to transmit the oxygen gas through the tube in the axis, since two volumes of hydrogen being required for one volume of oxygen, the larger ought to be used for the former; and the jet of hydrogen is placed between a jet of oxygen, within it, and the atmospheric air without.

"Under the table is a gallows, G, with a screw for attaching a pipe, leading from a self-regulating reservoir of hydrogen."

Having thus, I trust, satisfied your readers that the allegations which I made in relation to the priority of invention of the concentric jet is correct, I would ask to be indulged in a remark upon Mr. Rutter's blow-pipe alluded to by the correspondent in your last number. I observe that Mr. Rutter alludes to the fact of his placing the gases in two separate vessels, instead of in two compartments in the same vessel, as giving his blow-pipe claims to originality, even though one in which they were separated by a partition, may have been used. Now although the merits of the substitution of two vessels for one effectually divided, as in Dr. Hare's hydrostatic blow-pipe, may be small, I cannot permit him to take to himself even this; for in the figure just given of the compound blow-pipe and its appendages, "the pipe P is the eduction pipe" of the hydrostatic blow-pipe, which "may be supplied, either with oxygen gas, or atmospheric air," and

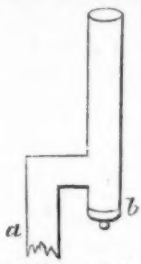
"another pipe, proceeding from a reservoir of hydrogen gas, is attached, by means of the screw and gallows, G, to one of the tubes communicating with the blow-pipe." (Hare's Compendium, p. 78.) So that the oxygen and hydrogen are not supplied from the same reservoir, nor from reservoirs having, necessarily, any connexion with each other.

Although in the original hydrostatic blow-pipe, Prof. Hare used but one partition to divide the gases, soon after two were used by him, and also by Mr. Cloud, whose modification consisting of two separate semicylindrical vessels so placed as to appear like one cylinder, was in operation at Peale's museum for many years. B.

FOR THE JOURNAL OF THE FRANKLIN INSTITUTE.

Description of a method of constructing the Flues of Locomotive Steam Engines, by which the escape of sparks will be prevented.

The escape of sparks from the flues of locomotive steam engines is not only a source of much annoyance to passengers, but sometimes, and particularly in a recent accident from this cause, has been productive of considerable loss. By a very simple arrangement of the flue, I have succeeded in obviating these inconveniences. Instead of allowing the pipe *a* to ascend directly up, I make a double elbow in it, as shown in the sketch. The upper section of the ascending pipe is continued down below the elbow, and is closed at bottom by a moveable cover *b*. All the larger particles of ignited matter which would otherwise escape in the form of sparks, fall into this chamber below the elbow, and any ashes which accumulate therein may be removed at pleasure. Should any sparks escape from the flue, a circumstance which rarely happens, they will be so minute as to burn out immediately, and produce no annoyance.



EBENEZER A. LESTER.

Boston, Massachusetts, March 1, 1833.

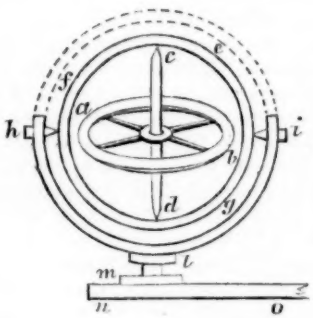
FRANKLIN INSTITUTE.

Monthly Meeting for Conversation on Mechanical Subjects. February, 1833.

At this meeting Mr. Rufus Tyler repeated the experiments made by him some years since, (in 1827–28,) on the effects of centrifugal force on bodies in rotation upon pivots. He first used a wheel, or disc, having a pin in the centre, acting in the manner of the common top, which, when made to spin upon the point of the pin, by striking the edge with a wide strip of leather, was made to ascend an inclin-

ed plane of iron, and lodge itself in a depression near the top. The inclined plane being attached to a whirling table, he showed that the motion of the table in the contrary direction from that of the top rendered the movement of the latter steady, although the velocity was considerably increased, the top inclining inwards in proportion to the increased velocity, while a rotation of the table in the direction of the top caused the top to dip *forward* and *outward* in its orbit, and ultimately to fly off.

The second consisted of a ring, (more properly a fly wheel,) like the first, having an axis passing through its centre and perpendicular to its plane, equal in length both ways from the plane; by means of the two pivots in which this axis terminated, the disc was suspended in an iron ring; this ring was itself suspended upon two pivots attached to another ring, the line joining these pivots being at right angles to the line of the axis of the disc; the last ring was fastened by a stem to the whirling table. A better idea may be formed of the apparatus by referring to the annexed sketch, in which *ab* is the inner ring, or disc, *cd* its axis, *c* and *d* being the pivots by which it rests in the second ring *efg;* this ring *efg* is hung upon the pivots *h* and *i* in the exterior ring *hli*, (half of which was cut off, since the first experiments,) and which is connected by the stem *lm* to the whirling table *no*. Motion was given to the disc *ab* by dexterously rubbing the axis with a stick. The table being moved in the same direction with the revolving disc, the latter remained in a position nearly horizontal, while the least motion in an opposite direction caused it to overturn, reversing the ends *c* and *d*. The ring *efg* was heavier on the lower side of its axis of suspension, *hi*, than on the upper side. These experiments elicited considerable discussion as to the causes of the effects observed.



Mr. Tyler claimed to have made these experiments and repeated them before different members of the Institute, (Dr. Thomas P. Jones, Dr. R. M. Patterson, Prof. W. R. Johnson, and James P. Espy, Esq.) before the apparatus called Laplace's, for showing the precession of the equinoxes, was introduced into the city, and before the Rotascope described in the eighth volume of the Journal of the Institute was brought before the public.

Mr. Reuben Gilbert submitted a horizontorium, or horizontal perspective, view of St. Stephen's church in Tenth street. This was critically examined, and gave rise to explanations of the general principles of this kind of perspective. The different views of those present were brought to bear upon the theory of this branch of art.

A moveable diagram of the steam engine, a drawing of the new fire engine of the Pennsylvania fire company, and a measuring gauge by Asa Spencer were placed upon the tables, but so much time had been devoted to other objects that the explanation and examination of them was deferred.

AMERICAN PATENTS.

LIST OF AMERICAN PATENTS WHICH ISSUED IN OCTOBER, 1832.

With Remarks and Exemplifications, by the Editor.

1. For an improvement in *Fire Arms;* Philip A. Morineau, city of Philadelphia; an alien who has resided two years in the United States, October 10.

The improvements claimed in this patent are intended, principally, for muskets, fowling pieces, and other guns of that description. In the general construction, these guns resemble some others which have recently been invented in France, but the patentee claims to have made a much better arrangement of the parts, and it is upon this that he founds his claims.

The gun is loaded at the breech, which is, for this purpose, made to revolve upon lateral trunnions. When the cartridge, with its percussion primer, has been inserted in its place, the breech in being turned round cocks the gun. The bayonet is fixed in a more convenient manner than upon the old musket, the absence of a ram-rod affording an opportunity so to do.

The advantages which this gun is said to possess over others, are that it may be loaded and discharged in any position, and with increased celerity; that it has less recoil; that it is secured against damp and wet; that it is not liable to become foul, and is readily cleaned; that its construction is more simple; that it requires no ram-rod, with its appendages; that it is cocked and primed by the operation of loading; and that the bayonet is more readily and conveniently fixed.

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2. For a machine for *Hulling Clover and Cleaning Wheat;* George Faber, Chambersburg, and Edward Faber, Pittsburg, Pennsylvania, October 13.

(See specification.)

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3. For *Propelling Locomotive Rail-way Cars up Inclined Planes,* by means of cog wheels on the ends of the crank axle; William Bent, City of Philadelphia, October 25.

The claim of the patentee is to the "having cog wheels on the ends of the crank axle, and racks for them to run on, on the top of an elevated rail-way, outside of the common rail-way, so as not to interfere with the body of the locomotive carriage."

This claim will render the nature of the thing patented sufficiently evident. The elevated rail-ways, are, of course, to raise the ordinary wheels above the rail upon which they would otherwise run; and the power gained will be in proportion to the diminution of speed from the small diameter of the cog wheels. Where there are elevations of different degrees, it is proposed to have two or more cog wheels, with corresponding rails and racks.

The ascending of inclined planes upon this principle is no new idea, as might be readily shown by reference both to English and American publications; we need not, in fact, travel out of the pages of this journal for the necessary evidence. We will cite one example only. In the September No. for 1826, there is the specification of a patent granted to Major, now Colonel, S. H. Long, for "improvements in locomotive engines, and in the mode of transferring loaded carriages from one level to another." One of the improvements consists in "a pinion to be added to each axle, to act upon a rack, or toothed rail, located midway of the rail track of each inclined plane."

When this pinion engaged with the rack, the ordinary wheel still rested upon the rails, but turned freely upon their axes, leaving the whole mechanical effect of the engine to operate upon the pinion, and thus to diminish the velocity of ascent in any assignable degree; a principle precisely the same as that now proposed to be applied.

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4. For an *Instrument for Setting Boxes in the Hubs of Wheels;* Jeremiah Chancey, Chesterville, Kennebeck, county, Maine, October 25.

The instrument here patented is intended for cutting the ends of hubs to fit boxes of various sizes. A block of wood, called a guide, may be made cylindrical, and about six inches in length; its diameter must be something greater than that of the largest box intended to be set by it. This block is bored through its centre, so as to receive a cylindrical shaft, or shank, as large as the smallest box intended to be set. On one end of this shaft there is a handle, like an auger handle, and on the other there is a cutter, which is fixed on the end of the shaft by a screw nut, allowing it to be set to cut a hole of any required size. The shaft must be at least as much longer than the guide as the depth of the box to be set, and must turn freely in it. On the lower end of the guide there is a flanch, perforated, to lie on the end of the hub, and to be attached to it by nails, or otherwise, during the operation of cutting.

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5. For an *Improvement in the Bush of the Bedstone of a Grist Mill;* William Bennet, Chesterville, Kennebeck county, Maine, October 25.

The object of this contrivance appears to be to adjust the bearings against the sides of the spindles by screws and wedges, and to give an opportunity of regulating, or lubricating it without taking up the runner. The description is not very clear, nor does the thing appear

to be of sufficient importance to demand, and compensate for, the labour of attempting to make it so.

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6. For a *Method of supplying Houses with Water;* William Bryant, Davidson county, Tennessee, October 25.

An elevated rail-way is to extend from the house to the reservoir containing the water. The box, or vessel, in which the water is to be conveyed hangs below the rail, being attached to a small carriage with wheels which run upon the rail. At the house there is to be a wheel and axle, turning by means of a crank, a rope from which, affixed to the vessel, is of sufficient length to allow it to descend to the reservoir; if the inclination is sufficient it will descend by its own gravity, otherwise the rope must be of double length, and pass round a pulley at the reservoir. The bottom of the vessel is furnished with a valve opening inwards, admitting the water when it dips into the reservoir. The claim is to "the principle of supplying houses with water by means of a rail-way and carriage, and the application of a rail-way and carriage to that purpose, whilst the person conveying the water remains at the house to which it is conveyed."

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7. For an *Improvement in Carding Machines;* Robert Bartlet, Ripley, Browne county, Ohio, October 25.

This patent is for a variation in the mode of working the comb in the carding machine; the description does not inform us, in what point it is superior to the methods now in use, nor can we discover it; without a drawing we cannot enable others to judge upon this point.

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8. For an *Improvement in the Cultivator, or Harrow;* Waldron Beach, city of Philadelphia, October 25.

The improvement for which this patent is obtained, consists in what the inventor calls a "two winged shifting tooth." The cutting part is made with two points at opposite ends, both exactly alike, in order that if one point breaks, or wears out, the other may take its place. To accomplish this, the tooth is made separate from the shank by which it is attached to the frame; and has a pin on its centre by which it may be fastened to said shank.

A longitudinal groove upon the shifting tooth, adapted to the fixing of it securely, is also described and claimed; and it is declared that these improvements render the tooth stronger, and more convenient and durable than those of the old construction.

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9. For an improvement in the *Machinery for manufacturing Paper;* patented by John Ames, Springfield, Massachusetts, May 14, 1822. Patent surrendered, cancelled, and reissued under an amended specification, October 25, 1832.

In the original specification, a very general and imperfect description of the machinery was given, without the slightest intimation of what was considered by the patentee as his improvement. The ma-

chine is of the cylinder kind first invented in France, and which has since undergone many improvements there, as well as in England and in this country; and by the amended specification it appears that the invention of the patentee consisted in the particular way in which he constructed his cylinder, his claims being in the following words,— "What I claim as new, and as my invention, is the construction and use of the peculiar kind of cylinder above described, and the several parts thereof in combination for the purpose aforesaid."

This apparatus having been long in use, and well known, we do not consider it as necessary to describe the cylinder as it is constructed by Mr. Ames.

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10. For an improvement in the *Common Grate for Burning Coal;* James Atwater, New Haven, Connecticut, October 25.

In this grate, which is intended for burning anthracite, there are to be registers or sliding shutters, made of soap stone, iron, or other material, which are to be furnished with chains passing over pulleys, and weights to counterpoise them. Sometimes there may be but one of these slides, but at others it is proposed to use two, and to hang them in such a way that they may direct the draft upwards or downwards. The back of the grate is to be hollow, and several pipes or openings may be used for the escape of air; the pipes, or flues, may also be made to return upwards and downwards so as to expose a large surface to emit heat. The claims are to "the invention of a fire grate with several openings or flues in the back, and behind the fuel, combined with a chamber in the rear of the grate, and a door below the grate opening into the chamber. The construction and adaptation of one or more gates, or slides, to a grate with several openings, or flues, in the back thereof, so as to be able to alter or change the draft of the grate by making it draw upward or downward, or horizontally; and so as to be able to close the whole or any part of the openings or flues, as may be required, at pleasure. And to the exclusive right to regulate the draft of a grate with an open back by means of one or more gates, or slides, as aforesaid."

We think that there are more contrivances about this affair than will be found to be either convenient or useful, leaving elegance altogether out of the question. We also think that the claims are too general and indefinite, and are likely, therefore, to interfere, or rather to be interfered with, by things which have been already and frequently done.

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11. For an improved mode of *Manufacturing oval and other Axes;* Ashael Collins, Winstead, Litchfield county, Connecticut, October 25.

(See specification.)

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12. For a *Machine for Shelling Corn;* Michael Carpenter, Lancaster, Lancaster county, Pennsylvania, October 25.

This shelling machine differs considerably in its construction from

any of those which we have heretofore noticed, and we have no doubt that it will work well. A wheel of about a foot in diameter, and four inches in thickness, is made to run horizontally. The periphery of this wheel is set round with iron teeth. One, two, or more smaller wheels, say of three inches diameter in the larger part, but turned somewhat conical, and set with teeth, revolve horizontally near to the periphery of the first wheel; they are so fixed that their distance from it will vary according to the size of the ear of corn. A board called a shelling board, is also so arranged as to aid in the feeding of the corn; this operation is effected by dropping the ear in endways through a tube, or tubes, on the top of the machine, which conducts it to the proper place. A riddle and fan are placed under the shelling apparatus.

The whole machine is described with much care and intelligence, but no part is designated as the foundation of a claim to a patent, and in this particular, therefore, the demands of the patent law are not fulfilled. The riddle and fan make as conspicuous a figure in the specification as those parts which are really new. Precise measures are also given of those parts the size of which may be much varied without injury to the operation, a fault which, if not fatal, is at least dangerous, as where nothing is specially claimed, every thing is to be considered as included in the patent.

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13. For an improvement in *Cutting Pliers;* Russel Curtis, Springfield, Hampden county, Massachusetts, October 25.

The improvement here claimed consists in the insertion of steel cutting dies, in dovetail grooves prepared for the purpose, instead of making the cutting part in one piece with the pliers. Different forms of pliers, and places for the insertion of the dies are referred to in the description, but the foregoing is the essential point of the invention. Although a simple, we think it a very good thing; in point of principle it is not new, but it may be so in its application to pliers.

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14. For an improvement in the *Churn;* Anthony W. Carrol, Granville, Licking county, Ohio, October 25.

The claim in this churn is to the formation of the dasher, and the manner in which it is made to revolve, and we believe that there is really something new in it, which is rarely the case with patented churns. Whether the novelty will produce advantages which will compensate for the complexity of the machine, we are not prepared to say. The dasher consists of two distinct parts, which are made to revolve in reversed directions in a vertical churn. One part of the dasher is in the form of a frame, which nearly fits the sides of the tub. Slats, set into this frame, project from it towards the centre. The frame is attached to a hollow shaft which passes up through the cover of the tub. A cylindrical shaft passes through this hollow shaft, rising above it, and its lower end occupying the centre of the tub; this has slats upon it which pass between those on the frame. Upon the hollow shaft, just above the lid of the tub, there are cogs which

form a pinion, and upon the cylindrical shaft, at its upper end, there is also a pinion. A vertical crown wheel, taking into these two pinions, causes the two parts composing the dasher, to revolve in opposite directions.

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15. For an improvement in the *Percussion Lock;* David G. Colburn, Port Byron, Gayuga county, New York, October 25.

This, so called, improvement, consists, we are told, of four different plans, which are little more than named, nothing like a description of them appearing. In the drawing, a particular arrangement of the parts of the lock is represented, the advantages of which we are unable to put upon record, as we do not perceive them.

There is no claim made.

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16. For an improvement in the mode of using *Water Proof Stiffening for Hats;* George W. Downs, Circleville, Pickaway county, Ohio, October 25.

A patent for stiffening hats by shellac dissolved in an alkali, which was to be afterwards neutralized by sulphuric acid, was obtained by Stephen Hempstead, jr. on the 26th of October, 1827; and this also is the process described in the specification before us. If Hempstead's claim is good, the present patent would be a violation of his right, even admitting that it contains a real improvement upon it, as it includes the same principle of operation.

To one pound of shellac four ounces of common rosin are to be added, and these are to be boiled with two ounces of pearlash in a gallon of water, until dissolved. The peculiar advantage of rosin, is said to be its cheapness, and we apprehend that it is the only advantage, as rosin, when combined with shellac, impairs its hardness, rendering it brittle, and crumbly.

Those hat bodies which have not been sized in vitriol, must be immersed in it before stiffening, and this is not to be soaked out, (as directed by Hempstead,) previously to this operation. When the stiffening begins to acquire elasticity by drying, the bodies are again to be put into vitriol water, as strong as that prepared for sizing.

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17. For an improvement in the *Machine for Gumming Mill Saws;* Jeremiah Case, Sodus, Wayne county, New York, October 25.

This is so much like the machines which we have previously described, most, if not all, of which possess little claim to novelty, that we have no more inclination to attempt a new description of it, than we should have to read "An act to amend and explain an act entitled an act to amend and explain an act entitled an act, in addition to an act, to regulate and establish the doing of certain things which have heretofore been regulated and established without any difficulty whatever."

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18. For an improvement in the *Construction of Boats and*

other Vessels; Albert Dorman, Norfolk, Norfolk county, Virginia, October 25.

This boat is to have a perfectly flat bottom, and with it the sides and stern are to form right angles; the fore part, or stem, is to form an angle of about 135 degrees; with this exception, the whole structure is a rectangular parallelogram, or in the vernacular dialect, an oblong square box. As in such a vessel, a rudder fixed in the ordinary place would have but little hold upon the water, and little water to hold upon, there are to be two rudders, one at each angle of the stern, moved simultaneously by one tiller. The bowsprit is to be fixed in the manner of those hinged masts, which are made to pass under bridges, the hinge joint being near to the foremast, against which it may be drawn up by a block and tackle. The claim is to "the before described mode of constructing boats and other vessels."

We apprehend that the antediluvian records of naval architecture were all destroyed in the Noachian flood, and that the celebrated ark which saved nothing but living beings, is the first vessel of whose form we have any authentic particulars. But for this, we have no doubt that certificates might be obtained of most of those who lived nine hundred and odd years, and begat sons and daughters, to the antiquity, and perhaps, so far as they knew, to the utility, of this rectangular mode of constructing boats and other vessels. It is most probable also that the

". . . . . Adventurous he
Who in the first ship broke the unknown sea,"

would inform us that he had made a safe and successful voyage in a vessel which was rectangular in all its parts, but that he had afterwards improved it by sharpening the bow, so as to present an angle of 135, or some other number of degrees, to the resisting element; and that he had taken a patent for his improvement, which, however, had expired A. M. 15.

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19. For an improvement in the *Planing Machine;* Thomas F. Fuller, Bristol, Hartford county, Connecticut, October 25.

The machine here described is to be applied to the planing and preparing wheel stuffs, plates, and faces, for making and manufacturing wooden wheeled clocks." A planing machine constructed, generally, in the manner of that described, is mentioned as having been previously in use. The plane is worked on a bed by a crank motion, and the stuff borne up against it from below. In the improved machine, a particular construction of this part of it constitutes one of its novelties; another is the mode of holding the stuff, and a third the shifting of it laterally, so that it may plane a piece of greater width than the jointer, which, it seems, was not the case with the old machine.

The points claimed are "the moveable slide or carriage by means of which the board, or other thing to be planed, can readily be moved under the plane or jointer, and sideways with it; and all that part of

the machine necessary to the convenient use of the slides, that is to say," &c. &c.

The moving of the stuff sideways under a plane worked in the manner described, is not in itself new. We have noticed other machines for planing stuff, in which this lateral motion was given; if, therefore, the present patentee can sustain his claim, he must depend, not upon the thing done, but upon his own particular mode of accomplishing it.

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20. For improvements in the mode of *Manufacturing Salt*, for which a patent was obtained on the 9th of September, 1825; Calvin Geuteau, Geddes, Town of Selina, Onondaga county, New York, October 25.

The former specification is recapitulated in the papers applying for the new patent. This specification states that the invention consisted of three wooden vats, with boilers attached to each, and placed side by side. Two of the vats were for cleansing the water; and when cleansed it was to be drawn off into the third, which was the middle vat, in which it was made into salt. The settling vats were covered, but had small openings at their ends to let off the steam. The middle vat was also covered to a considerable distance, in order to prevent the escape of heat during boiling; and was so extended in length, that the salt when formed on its surface might be carried by the current of heat towards the colder end of the vat and there deposited.

The boilers were from twelve to twenty feet in length, and three in diameter. One end of each boiler was open, and fitted into the vats, so that the water flowed freely from one to the other. The boiler was built up in a proper arch with fireplace, flues, &c. Into the two settling vats, when sufficiently heated, quick lime was to be thrown, which would cause the impurities to settle, with itself, to the bottom of the vat.

The specification of the improvement states that there is to be a wooden vat forty or fifty feet long, ten or twelve wide, and from five to five and a half deep, having a partition along its centre from front to rear, secured by caulking, and strongly supported. The whole is to be covered with plank, so as to confine the steam. Two doors are left through the cover, near the front, and two near the rear, to be opened when requisite.

There are to be cylindrical boilers, as before, but differing somewhat in their construction, and in the manner of setting them, both of which are particularly described. The boilers have iron pans fitted to them, and these are made so that they can be drawn out to remove the matter deposited in them. They are also to have man holes in front, in the manner of ordinary steam boilers. Steam boxes are made to pass along each division of the vat; a description of the construction and management of these would require more space than it would be generally desired should be given to it, particularly without the drawings required to make it plain: leaving, therefore, this

and some other parts, we will proceed at once to the claims of the patentee. These are to "the peculiar construction of the cylinder, and the application of it to boiling crude salt water, and the sheet iron pan placed inside of the same. The manner of setting the cylinder in the wall, grates, flues, &c. The manner of boiling in wooden vats, and their construction. The side vats, and saturating with a stream of boiling salt water, running on to salt, and separating the impurities in the side vat, and passing the pure brine to the salting vat. The manner of applying the steam to make salt, with wooden boxes and metallic covers, and the boxes at the end of the steam boxes regulated by a door, or slide, to retain the heat and prevent atmospheric pressure. The manner of turning the steam on one vat, or both, as occasion requires."

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21. For a *Composition for Painting, and for Lubricating the Ways for the Launching of Vessels;* Whitman Mead, Greenwich, Fairfield county, Connecticut, October 25.

We are told to take soap stone, or antinolite, to reduce it to a fine powder, and then to mix it with oil of any description, viz. whale, fish, linseed, sperm, olive, or any other; and, in order to produce a variety of colours, we must add whatever may be requisite. The pulverized soap stone is also to be mixed with tar, pitch, varnish, or resin, to cover the sides and decks of vessels. This is the sum and substance of the specification.

We apprehend that instead of *antinolite*, the patentee intended steatite, of which soap stone is a variety. Soap stone has been employed for lessening friction in machinery, whether it has ever been used to give a body to paint we are not informed. What may be its good properties when so employed can be judged of from experience alone, and whether or not the patentee has had any opportunities of informing himself in this particular, he has not told us. Should it prove to be more durable than any other article which is equally cheap, it may come into use, but otherwise we apprehend that the patent will prove to be a dead letter.

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22. For *Medicine for the cure of Cholera and other diseases;* Jacob Houck, Baltimore, Maryland, October 25.

A list of formidable diseases is given in the caption of this specification, which are to yield to this newly discovered medicine; these diseases are cholera, bilious or cramp colic, wind in the stomach or bowels, diarrhœa, dysentery, cholera morbus, rheumatism, gout, spasms, or fits, cramps, ague and fever, and the nightmare. The medicine consists of gum guac, juniper oil, and rye whiskey in equal proportions; a table-spoonful of a mixture of which, with an equal portion of water, is to be taken whenever any premonitory symptoms are felt, and to be repeated in half an hour should the first not be effectual. If the pain is severe, double the dose, and repeat it in two hours. When the pain is relieved take fifteen grains of calomel, and after this, a dose of oil.

No further instructions are given in the specification, and we are at a loss to know how the foregoing can be applied to the symptoms of nightmare, which seldom troubles us in our waking hours, or to some other of the disorders named.

As regards the application of this medicine in spasmodic cholera, we have no doubt that it would be equally efficacious with a number of the nostrums administered by empirics in that fatal disease; we most sincerely hope, however, that the patentee may never have an opportunity of testing its virtues in this instance, and that if he should, the patient may reject the medicine, and dismiss the *doctor*.

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23. For an improvement in *Lamps for Burning Compound Spirits or Oil;* William Magee, city of New York, October 25.

There is some difficulty in guessing, from the specification and drawings, in what consist the improvements which are intended to be patented, although, in the latter, there are eight different forms of this lamp represented. The general construction is that of the Argand's lamp, with glass burners. A conical piece, which may be raised or lowered, occupies the places of the button, or disc, which is sometimes used to force the supply of air through the centre tube against the wick. The draft on the outside of the circular wick is also to be directed towards the flame by a hollow, truncated cone, or inverted funnel, which surrounds it. There is not in this specification any thing which we can torture into a claim.

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24. For a *Machine for Extracting the Stumps of Trees;* John E. Larkin, Salem, Washington county, New York, October 25.

We have here the inspirations of the same genius which presided at the period of the invention of some of the predecessors of this stump extractor. A rope is to be wound round a drum, which is fixed upon a shaft in the frame work of the machine, and the power is to be derived from the drawing of this rope by horses, or other animals. An endless screw upon the shaft of this drum takes into a pinion on a second shaft, around which is to be wound a chain that is attached to the stump to be raised. The frame of the machine is to be moored to stumps, or to other suitable, fixed objects.

The claim is to "the before described machine, particularly the mode in which the endless screw is applied for that purpose."

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25. For *Machinery for Hammering or Hardening Taps, or Soles, for Shoes and Boots;* Stillman Knowlton, Athol, Worcester county, Massachusetts, October 25.

Instead of hammering the leather, it is to be passed between two rollers, one placed above the other like the rollers of a flatting mill; the rollers are not to be cylindrical, but one of them, the upper, is to be concave, and the other convex, so that the leather, when rolled, shall be in a proper shape for the last. The gudgeons of the lower roller, raise by a moveable lever, and it is forced against the upper

roller by placing the foot upon a treadle; a spiral spring relieving it when the foot is removed. The operator places one end of the leather between the rollers, puts his foot on the treadle, and then, with his right hand, turns a crank, which by means of wheels and pinions gives motion to the rollers. The leather, it is observed, may be hardened to any degree, according to the will of the operator, and one man can perform as much work as ten in the usual way.

The claim is to "the position of the rollers, the one being placed above the other, and the application of the spiral spring." If this machine is new, and operates as well as it is said to do, and we see no reason why it should not, we think the claim most palpably defective. The rollers might with equal advantage be placed side by side, and the effect of the spiral spring rendered unnecessary by other contrivances. The claim, it seems to us, should have been to the rolling of leather for soles, between rollers of the kind described, instead of hammering them, as has been heretofore done; one of the rollers being so fixed as to admit of its being forced against the other by means of levers, or other suitable contrivances.

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26. For the *Adaptation of the Anthracite Coal Stove to open Fireplaces;* Eliphalet Nott, Schenectady, New York, October 25.

This improvement is said to be "applicable to stoves and furnaces of every sort; whilst the friction of the rotary grate is diminished, the durability of the vertical grate increased, the escape of gas and ashes prevented, the ventilation of the room provided for, and the consumption of fuel diminished."

We noticed at p. 172 and 173, two patents for improvements in the apparatus for burning anthracite, issued upon amended specifications; the present patent is an original, in which the general principles adopted in the former stoves, are applied to those used in open fireplaces.

As in the former instance we were unable to give a full description without engravings, so also in the present we must content ourselves by stating that the adaptation to grates, of those principles which have been approved in the stoves, appear to be managed with much skill, and the models and drawings in the patent office represent structures which are ornamental, and have also some claim to elegance.

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27. For *Manufacturing Nails of various descriptions;* Freeman Palmer, Buffaloe, Erie county, New York, October 25.

The object to be accomplished by the machinery used by the patentee, is the cutting of nails from rolled iron, so that the grain of the iron shall run with the length of the nail. Rollers are to be prepared, which are grooved longitudinally in such a way that iron rolled through them will have the head, and the wedge form of the nail, or brad, formed on one or both sides of it, as the case may be. The part to form the heads of two nails stand together, with divisions between them produced by ridges on the rollers. The plate thus rolled

is then to be cut into strips crosswise; the length of one or two nails determining the width of the strips. A common nail cutting machine is then used to cut these strips in the usual way, the cutters, however, being so formed as to adapt them to the shape given to the strips by rolling. The patentee says—

"This invention, or discovery, of a *new application* of machinery, now in use, for manufacturing cut nails, to a *new* purpose, viz. that of cutting flexible nails, or such as may be clenched, and will answer the purpose of wrought nails, I specifically claim as my own."

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28. For *Machinery for Propelling Boats;* James King, Ogden, Monroe county, New York, October 28.

There are some endless things which soon come to an end, and such we apprehend will be the case with the endless chain of buckets by means of which the present patentee proposes to propel canal and other boats.

The boat is to be of the kind called a twin boat, having two keels, with a space between them along which the buckets are to pass. Two drums, one at the stem and the other at the stern, are to have endless chains, composed of flat links, passing round them, and to these the buckets are to be attached, and properly braced. Those buckets which are out of the water pass through a trunk above the deck. Motion is to be given to the chain by applying the power of steam to the drum at the stern.

The same apparatus is to be applied to current mills, &c.; there, however, is no claim made to it for either use, that having been previously done, on more than one occasion.

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29. For a *Thrashing Machine;* Squire Gambell, Onondaga, Onondaga county, New York, October 25.

It is really some time since we have encountered a thrashing machine among the patents, and the holiday has been quite a refreshing one. We shall not, it is true, have much trouble with the one now before us, having so frequently met with, and disposed of the like. All we need say of it is, that there is to be the usual cylinder and concave bed, and that these may be made in a variety of ways, leaving great latitude of choice to the maker. We think the patent secure against infringement, as it merely tells us what we may do, and not what we are to avoid, and the things permitted having been before done, may again be ventured upon, without fear.

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30. For a *Cheese Press;* Benjamin Hinkley, Fayette, Kennebeck county, Maine, October 25.

The bed upon which the cheese is placed is made to rise so that its pressure may be effected between this raising bed, or follower, and the cross piece which connects the two cheeks of the press. A piece descends from the under side of the follower, between two rollers which cross the press from side to side near its bottom. These rollers have their bearings in the cheeks of the press, and one of them has holes made in it to receive a handspike, or lever, which acts upon

it in the manner of a common windlass. A rope is inserted in the rollers by one end, and the other is affixed to the lower end of the stem, or piece, above mentioned, in consequence of which when the roller is turned by means of the lever, the follower is forced up. To cause the rollers on either side of the press to act simultaneously, they are furnished with whirls upon their ends, which are connected by a leather strap in such a way that they concur in raising the follower. A rag wheel and pall at the opposite end hold the rollers in their places.

The patentee claims the particular mode of uniting the pulleys and rollers, and their connexion with the follower; likewise the arrangement of the several parts in the way described, as constituting a new combination for effecting the purpose intended.

We believe the arrangement of the parts to be new, and that in this respect, therefore, they present a just claim to a patent; we do not perceive, however, in what respect this is superior to other presses which have been constructed for the same purpose.

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31. For a *Spring Lancet, with a Guard;* Samuel Wilmot, Bridgeport, Fairfield county, Connecticut, October 25.

The principal *novelty*, we apprehend, in this lancet, is supposed to be the guard, which is a piece of metal having a slot in it, and attached to the case; the blade of the lancet is to pass through this slot, in the operation of bleeding. The guard is made adjustable, to regulate the depth to which the lancet is to pass, and is, in using it, to be laid and pressed upon the vein.

The manner of fixing the spring, and the adjustments of the guard, are explained in the description; but in these there is nothing specially noticeable. As respects the guard, it has been long known to us. We saw a lancet with one, in the hands of a gentleman in Philadelphia at least twenty years ago. Some bleeders are in the habit of regulating the depth of the cut by taking out the small spring under the blade of the lancet, leaving it to play up and down loosely; by laying it on the vein in this state, it may be sustained at any height by the skin, and will, when struck, enter to a corresponding depth.

The patentee makes no claim, but if he had done so, the guard, we suppose, would have held the most prominent place; he no doubt supposed that to be new, as it has never gone into general use, and may not now, although it is patented.

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32. For a *Machine for cutting Fur from Pelt;* Dennison Williams, city of New York, October 25.

It is intended, by means of the machine here patented, to cut a portion only of the fur from skins, leaving them still with enough upon them for the manufacture of trimmings, caps, and other articles for which fur is employed. It is stated that whilst a quantity of fur is thus obtained for the manufacture of hats, the pelt will frequently be rendered the more valuable by cutting it down to that part where the fur is finest and thickest.

A considerable number of knives are to be prepared of such length and width as may be required by the nature of the fur to be cut. Their edges are to be straight, and they are to be pointed at one end; by their opposite ends they are to be fixed in a piece of wood, or metal, so that their blades may form an angle of about 45 degrees with the face of the piece in which they are fixed, their edges being even with it, and all lying in the same horizontal plane; they will then stand, in relation to each other, like the slats of a Venitian blind, but they are, in general, to be within one-fourth of an inch of each other. The pointed ends then stand out like the points of a comb, and may be passed through the fur of a skin, laying upon a table. A strip adapted to the purpose is then placed over the points of the knives, by which means the frame by which they are enclosed is rendered complete. A portion of the fur rises above the blades, and this is what is to be cut off. A single knife, called the operating knife, is fixed to a block which is made to slide over the frame; the edge of this knife just clears those before described, and cuts the fur, to do which the more perfectly it is made to pass in an oblique direction. Another modification of the machine is described, which, however, is the same in principle.

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33. For an improvement in *Water Wheels;* Thomas Winslow, Jay, Oxford county, Maine, October 25.

Folding ladle boards are to be attached to this wheel, which are to open, and be acted upon in one direction, but are to close during one-half of the circuit of the wheel. The affair is, in fact, a current wheel, with folding buckets, hinged so as to extend from the periphery to the shaft, and having check chains to regulate the width to which they shall open. We have had to notice numerous contrivances of this kind, but never have made, and never expect to make, our notice approbatory. They are all poor contrivances, the buckets not standing open more than half the time appointed for them; they do but little work, being in a rickety state, and often wanting the doctor, who, if a man of skill, soon pronounces them incurable.

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34. For an improvement in the *Manufacture of Moccasins, Socks, Boots, Shoes, Mittens, Gloves, &c.;* Dennison Williams, city of New York, October 25.

The dressing of skins with the fur on for manufacturing the above articles, is the subject of this patent. The composition used is seal oil, potash, pyroligneous acid, and salt, which are to be mixed together and rubbed upon the skin, heat being employed to aid the friction, and the operation being continued until the skin is saturated, and rendered flexible, and water proof.

Sal ammoniac is sometimes to be added, but this, and the proportion of the other ingredients, is left to the discretion of the operator. The patentee says that this composition is preferable to any other used for the same purpose. Upon the face of the thing it seems to

present some chemical contradictions, but against the evidence of facts, when made clear, we have nothing to urge.

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35. For a *Churn;* Eli Wellman, Salem, Jefferson county, Ohio, October 25.

In this churn there are to be two dashers, the shafts of which are operated upon by two cranks on a shaft within a frame above the body of the churn. By turning a handle, a wheel revolves, and a strap from this passes over a whirl on the crank shaft. This kind of contrivance may be good enough, and we see no reason to object to it; as a patented affair, however, its pretensions are more than questionable, yet the patentee has contrived to make out several claims, some of which, and we believe the whole of them, would have been relinquished had he sought the proper lesson at the patent office. He claims, for example, the iron crank with two bends; the double dashers, and the joints in the pitmen by which they are attached to the shafts of the dashers.

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36. For a *Smut Machine;* Samuel Winslow, Poughkeepsie, Dutchess county, New York, October 25.

This machine resembles, in its general construction and operation, the common mill stones for grinding; but the rubbing surfaces, or scouring plates, may consist of punched sheet iron, or they may be of stone, or of cast iron. A hopper for feeding, a bridge tree for regulating, a curb, spout, &c. are to be fixed much in the usual manner. As the rubbed grain passes to the spout, it is acted upon by a fan wheel which drives the smut, &c. through a trough, away from the grain.

This machine is said to be in some respects an improvement on "Case's smut machine," and we think that it resembles it not a little; to avoid interfering, however, he says that he "claims the right of running it in any place in a mill, except on the curb over the stone, and by any gearing in a mill except by the damsel."

If a patent is to depend upon the place in which a machine is used, or upon the precise part of other machinery from which it derives its motion, its prop is a very weak one, and a patent must not be a weighty concern.

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37. For *Fireplaces for the Burning of Anthracite or other Fuel;* Artemus Turrel, Boston, Massachusetts, October 25.

The grate upon which the fuel is to be burnt is on a level with the hearth, there being an air flue from below, or from without the room, leading to it. A sort of forked poker, which the patentee calls a picker, rises through the bars of the grate, to disturb the fire, and is to be moved by a lever. These are the two things claimed, and they do not, as represented, induce us to break the tenth commandment.

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38. For a mode of *Making Awl Hafts;* David M. Smith, Gilsum, Cheshire county, New Hampshire, October 25.

The common shoe-maker's awl is to be fixed in the haft which the patentee describes, and his claim will probably afford as much information respecting it as most of our readers will desire to obtain; it is as follows:

"What I claim is the mode of constructing an awl-haft so as to move, in and out, a split socket into which the shank of an awl blade is inserted, and by which it is held firmly."

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39. For a *Churn;* Joseph Rickey, Morgan county, Ohio, October 25.

We described a churn, No. 14, with double revolving dashers. This is exactly like it excepting in the mode of giving motion to the dashers, which, in the present instance, is effected by whirls and bands, there being one on each of the shafts, and two upon an upright shaft which is to be turned by a crank. The band which drives one of the dashers is crossed, to give the reverse motions. Both the patentees reside in the state of Ohio, and being subjected to similar meteoraceous influences, may possibly account for the similarity in their mental productions.

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40. For a *Machine for Cutting Endless Screws;* John H. Schrader, city of Philadelphia, October 25.

The screws are to be formed by revolving cutters, operating in a way which cannot well be explained without a drawing. The purpose to which the instrument is applied, is principally, we believe, for cutting the endless screws on the tightening keys of guitars, and other musical instruments of that description.

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41. For *Carriages for Rail-roads;* Isaac Cooper, Baltimore, Maryland, October 25.

This patent appears to be taken for a mode of attaching together two or more cars for rail-roads, so as to give them the necessary play, and attain other advantages. The frame work of the cars is put together much in the ordinary way, with two side pieces, and five cross pieces mortised and tenoned together. The wheels and axles are to run in boxes as usual; the improvement consisting in what the patentee calls safety bars, which are used for connecting two cars together. Suppose two cars brought up within a few inches of each other, two bars are placed below the cross bars of the cars, extending to about the centre of each; they stand parallel to each other, within, and free from the wheels. Through each of them there are two long mortises, or slots, which admit screw bolts, to attach them to one of the cross bars of the cars, the slots allowing the bars to play lengthwise. They pass through staples on another cross bar, which are made so wide as to admit of sufficient lateral play to enable them to adapt themselves to the curvature of the road. There are cushions of leather, or other yielding material on each end of the bars, and a yielding piece, or spring board, for them to strike against, which are

to prevent injury when the first car is stopped, and the second advances upon it.

As a check to the lateral motion of the cars, there are also to be chains crossing each other diagonally between the connected ends of the cars; that is, a chain placed a few inches from the end of one of the side pieces, extends diagonally to the opposite side piece of the other car, and so of the other two side pieces, the two chains crossing and forming an ×.

The claim is to the manner of constructing and applying the safety bars, by means of which the cars may run safely, although one or more wheels be broken; and by means of which a pair of wheels may be dispensed with from each car; also to the transverse chains to prevent too much lateral play; also to the cushions and fender pieces.

We do not anticipate all the advantages from this thing which the patentee appears to contemplate; he says that when the bars are thus attached, both of the pairs of wheels near the attached ends may be taken away, one pair answering as well as two. Now if the cars are loaded, it is plain that the weight upon the safety bars will prevent their working so as to adapt themselves to a curved road. The cars, it is said, may be made with one pair of wheels placed in the centre; but in this case they, and their bearings, must be made proportionably strong; and still there would be no novelty in making cars with two wheels only: those patented by Mr. Saml. T. Jones, (see vol. v. p. 149,) were of this description.

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42. For an improvement in *Water Pumps;* Moses Buclin, Grafton, Grafton county, New Hampshire, October 25.

The improvements described in this patent are quite as good as many others for which patents have been taken, especially those for pumps; respecting the action of which, simple as it is, there is an abundant stock of ignorance, even among the makers themselves. The patentee claims two things as of his invention, one of which is the boring of the pump log, immediately below the chamber, conical; a lining of lead is to be prepared to fit this, and is to terminate in a pipe of lead, leading to the water in the well. This lead lining is to be jammed down so that it may fit itself to the log; at the bottom of it, there is a valve covering the end of the leaden pipe. The object of this contrivance is to make all the parts concerned, water tight. The lead, we are told, will be perfectly wholesome, a fact of which we might otherwise have entertained some doubt.

The next *improvement* is a vacuum, or air vessel; this name to be sure appears a little contradictory, but in this it does not stand alone. The vacuum, or air vessel, is to be fixed near the pump; it is in the form of a barrel, and lined with lead; the pipe from the pump enters it at one end, and at the other, it is entered by that leading from the well; it may be considered, therefore, merely as an enlargement of the pipe itself; we are not illuminated by the patentee as respects its modus operandi, he only telling us that it is of great use when the water is to come from a great distance.

43. For machinery for *Polishing and Cleaning Rice;* Joshua M. Buskey, city of New York, October 25.

A trough four or five feet in length, and about twenty-two inches in diameter, is to be made in the form of a half cylinder, and, this placed horizontally, is to contain the rice to be cleaned. A cover is made in the same form, which, when put on, renders the cylinder complete. An internal cylinder, supported upon gudgeons, is to revolve within the trough. This may consist of two circular heads, with iron bars extending from end to end, or of a solid cylinder, with projecting spikes. The rice, mixed with emery, or with sand, is to be let fall from a hopper into the trough, when the motion of the internal cylinder will quickly clean and polish it. A fine sieve is afterwards employed to separate the emery, or sand, from the rice.

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44. For a *Rack Wrench*, for turning the nuts of screws; Henry King, Springfield, Hampden county, Massachusetts, October 25.

This is intended as a substitute for the screw wrench, to which we think it superior in all respects. The main bar of the wrench is square, and the upper side of it is notched across, to receive a click. The sliding cheek of the wrench is supported by a piece projecting from the back of it which rests upon the bar. This carries a spring and click, and when the wrench is to be used, all that is necessary is to push the sliding piece against the nut, the spring forcing the click into one of the notches on the bar, and thus holding it in its proper place.

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45. For machinery for *Breaking and Cleaning Hemp and Flax;* Arnold Zellner, Giles county, Tennessee, October 25.

The machine for breaking the hemp, consists of two fluted rollers, one placed above the other. The bottom roller is usually about two feet in diameter; the top one a foot, or more. The spaces between the flutes are about one and a half inch, which breaks the stalk into lengths of about three-fourths of an inch. The feeding is effected by placing the hemp upon an inclined plane, and advancing it, by hand, between the rollers. If properly rotted, it is passed but once through, and is then ready for the cleaner.

The revolving cleaner consists of two circular heads placed upon a shaft, with four beaters of hard wood, or metal, passing from one head to the other. The spaces between these beaters have boards inserted, so as to form a quadrangular box. The circular heads project farther than the beaters, and prevent the hemp from getting beyond them, towards the gudgeons. These beaters revolve in a semicylindrical trough, formed of slats, or laths, extending along it, the shives escaping through the spaces between them. The hemp, held in the hand, is passed in about one-half of its length, and when that is beaten clean, the other end is operated upon.

The dust, &c. escapes through a trunk leading to the outside of the building.

The fluted rollers are not claimed, but only the particular manner

of constructing them, as described. The cleaning apparatus is claimed as new in its whole arrangement.

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46. For a *Washing Machine;* Camm Moore, Guilford county, North Carolina, October 30

Eight pages of close writing are devoted to the description of this washing machine, the precise dimensions of every piece being given, together with instructions to the workman who is to make it. We, however, must be content with a very general and brief description. The clothes are to be placed in a longitudinal trough, the bottom of which is formed of slats, and rollers are to be passed over them. These rollers, two or more in number, consist of circular heads, with slats passing from one to the other, and forming the periphery of the rollers. The slats are placed obliquely, and slope in reversed directions on the two rollers. The rollers are preserved in their respective situations, and act together by having their gudgeons, at each end, pass into holes in strips of iron; the lever, therefore, which drives the first acts also on the second. The bottom of the trough may be made of sheet iron, and the water in it be heated by a fire beneath it.

It is contemplated to apply this machine to the washing of wool, the scouring of leather, and other purposes.

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47. For a *Steam Engine;* Seth Boyden, Newark, Essex county, New Jersey, October 31.

We were going to say that the patentee has presented us with another rotary engine, but this would have been incorrect, as he has merely again presented one which others had before offered. The principle and general arrangement are precisely the same with that of several rotary pumps which we have described, some of which it has been proposed to use also as steam engines. Two toothed wheels, gearing exactly into each other, are enclosed within a cylinder, into which steam is admitted from below, and from which it escapes through another tube above the toothed wheels. The teeth of the wheels must work, in part of their circuit, close against concave pieces, which may be said to form their stuffing.

Defective as the rotary steam engine usually is, this is about one of the worst forms which has been given to it, and, like contention, it is best left off before it be meddled with.

Specifications of American Patents.

Specification of a patent for a machine for Hulling Clover and cleaning Wheat. Granted to George Faber, *Chambersburg, and* Edward Faber, *Pittsburgh, Pennsylvania, October* 13, 1832.

To all whom it may concern, be it known, that we, George Faber, of Chambersburg, Franklin county, and Edward Faber, of Pittsburgh,

Allegheny county, in the state of Pennsylvania, have invented an improvement in the machine for hulling clover, and other seeds, and that the following is a full and exact description thereof.

The general principle upon which this machine is constructed is the same as that of some other hulling machines already in use; that is to say, it has a cylinder which is made to revolve within a concave cylindrical segment, between which two parts the seeds are rubbed, and the hulling is effected; but the improvement which we have made consists in covering either the cylinder or the concave with bristles, so as to form the same into a brush; we, however, prefer the converting of the cylinder into a brush, although the end may be obtained in either way. In describing our machine we shall consider the cylinder as being so made.

The concave may be formed of various materials, and we do not intend to confine ourselves to any one, but merely to construct it in such a way as that it shall be sufficiently rough on its surface, or present such asperities, as shall enable the brush by its revolution against it to hull the seed completely.

We intend, in some cases, to make the concave of cast iron, furnished with flutes from end to end, or with fine teeth, or points upon its surface, which will answer the same purpose. Instead of using cast iron, we shall, sometimes, bend sheet iron into the proper form, punching it all over, so as to convert its inner surface into a grater, by the asperities which will be thus raised. We also design to use sand stone made into the proper form, or to mould a mixture of plaster of Paris, or other cement, with sand, emery, pulverized glass, or other hard substance; or to attach such substances to wood, or other articles, by means of glue, paint, or otherwise; not intending, however, to claim either of these as making any part of our invention; the whole, or the greater part of them, having been before employed for the same, or for similar purposes.

The feeding may be effected by means of a hopper, in the usual way, and a fan may be added to separate the chaff from the seed.

What we claim as our invention, and for which we ask a patent, is the covering of the cylinder, or the concave, with stiff hair or bristles, so as to form the same into a brush, between which and a surface made rough by any suitable means, the seed and the hull of clover, or other grass, are separated from each other, in the manner, and upon the principle hereinbefore described.

GEORGE FABER.
EDWARD FABER.

Specification of a patent for an improved mode of manufacturing oval and other Axes. Granted to ASAHEL COLLINS, *Winstead, Litchfield county, Connecticut, October* 25, 1832.

To all whom it may concern, be it known, that I, Asahel Collins, of Winstead, in the county of Litchfield, and state of Connecticut,

have invented an improvement in the mode of manufacturing oval, or felling, and other axes, by the aid of rollers, and that the following is a full and exact description of the same.

Rollers have been heretofore employed for the making of axes, and of many other articles of iron, which are usually forged out on the anvil by the hammer; I do not therefore claim to be the inventor of rollers, or of their application to the object in view, but only to such a construction or form of them as shall obviate the difficulties which have been hitherto experienced in the use of them. As heretofore employed, the rollers have been indented in such a way that when made to revolve, and properly geared, a bar of heated iron passed beetwen them might receive the desired form, so far as it could be effected by them; it, however, has not been found possible to give to their sides, or edges, that precise shape which the axe should have when finished, in consequence of the tendency of the metal to spread laterally, the rollers, as constructed, not confining the iron at the sides or edges, but on the faces only.

In my improved mode of forming the rollers, I make two grooves in one of them, surrounding the roller, and at such a distance apart as shall correspond with the width of the axe, or axes, to be formed; and on the other roller, I make two projecting rims, or fillets, which fit into these grooves. The inner edges of each of these rims, or fillets, are so curved or indented as to correspond with the swells, or indentations to be formed on the edges of the axe; such a shape being likewise given to the inner edges of the grooves, or, (which is the same thing,) to the exterior edges of the projecting part between the grooves, by which one face of the axe is moulded, as shall likewise correspond with the curvatures, or indentations, on the inner edges of the rims, or fillets.

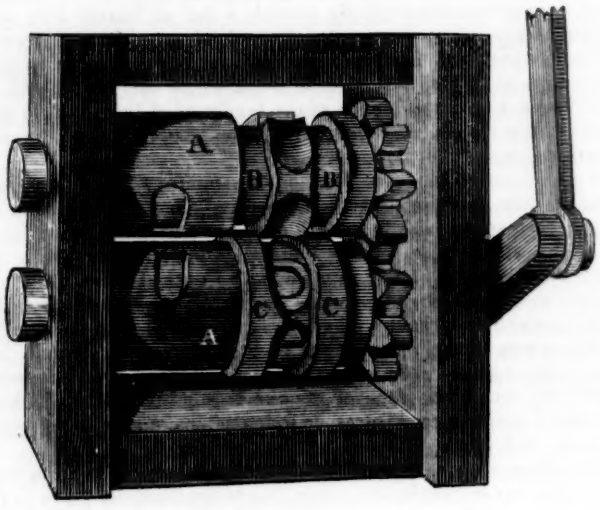
The rollers may be so excavated, or indented, as to form two or more axes, in one revolution, according to the diameter given to them; and they are to be so shaped as to deliver the axes ready for doubling over, with the edges and points so formed as to be ready to receive the steel, so that the final welding may be at once performed. The bar from which the axes are to be rolled may be of any convenient length, and will not require to be divided or cut into lengths, previously to rolling. Rollers, as above constructed, may be varied in their form so as to suit all the different kinds of axes made; and the steel for the axes I likewise prepare by rolling in the same way.

For the purpose of finishing so as to give a more smooth surface and a more precise form to the axes than will be afforded by the rolling and subsequent welding, I prepare dies of steel which may be fastened upon rollers by screws, or otherwise, and between these the axe is rolled by a vibratory motion, carrying it from end to end of the dies. Although I have named rollers, it is manifest that segments of rollers only are requisite for this purpose. A weighted lever, or other power, may be used to press the rollers together. A powerful press, with dies adapted thereto, may be made to answer a similar end. The forms given to such dies, must necessarily be governed by the nature of the work which they have to perform.

What I claim as my invention is the use of the rims, or fillets, and the corresponding grooves by which the metal is confined laterally, and the eye, the oval, and other parts, are made to assume their proper forms in the manner hereinbefore described. I also claim the using of steel dies fixed upon rollers, or segments of rollers, for the purposes set forth.

ASHAEL COLLINS.

Collins' Axe Machine.



A A, rollers. B B, grooves. C C, projecting rims in the other.

Abstract of the specification of a patent for improvements in the Bar-share or Fallow Plough. First patented October 1, 1825, *which patent was surrendered, and cancelled, on account of a defective specification, and reissued to the patentee,* GIDEON DAVIS, *Georgetown, District of Columbia, March,* 6, 1833.

(WITH A COPPERPLATE.)

The greatest possible perfection to be attained in the bar-share or fallow plough is, that it be so shaped and constructed as to detach the furrow slice from the solid ground, raise it up, and turn it over, in the easiest, the neatest, the most uniform, and effectual manner, with the least labour, both to the ploughman and the team; combining at

the same time also, the advantages of being simple in its construction, strong, durable, easy to keep in repair, and cheap.

With a view as far as is practicable to combine all these various objects, I begin by making the mould-board, land-side, and standard, (a birth, or place for the beam to rest on,) all of cast iron, and in a solid piece; this I do in the manner in which Charles Newbold, of New Jersey, made his improved plough, patented in the year 1797, but with the several alterations and improvements hereinafter particularly specified and described.

First Item. Of the shape of the *moulding part*, or what is commonly called the *face* of the *mould-board.*—The general principle heretofore approved by scientific men who have turned their attention to this subject is, that as the furrow slice is detached from the solid ground at a straight line parallel to the surface, that it should be raised up and turned over, so as to retain as far as possible, that same flat shape; and in order to accommodate the shape of the moulding part, or what is commonly called the face of the mould-board, to this idea of raising the furrow slice up, and turning it over, it has been so constructed as to form straight lines lengthwise, either horizontal, or more or less inclined, so as to correspond with another set of straight lines at right angles with the land-side, or nearly so, commencing at the point, touching the edge of the share and lower edge of the mould-board, which as they recede from the point of commencement, gradually change from a horizontal to a perpendicular direction, and even pass beyond the perpendicular far enough to give the proper over-jet behind. And it has been thought that mould-boards so constructed, would fit and embrace every part of the under side of the furrow slice in the operation of raising it up, and turning it over in the most perfect manner possible; not observing, however, that the furrow slice does, and must necessarily, acquire a convex form on the under side, during the operation. But the true state of the case is, that in raising the furrow slice, and turning it over, it always does either acquire a convex form on the underside, or else it is broken off into pieces, and thrown over. But it is found, that mould-boards which are constructed on this principle, wear through about midway, whilst the upper and lower edges are scarcely rubbed at all.

In order to remedy the inconveniences arising from this mode of structure, I form the moulding part, or the face of the mould-board of my plough differently. This I do with a view to make it fit and embrace the convex form which the furrow slice is disposed to assume, and thereby bring it, as near as may be, to an equal bearing on all parts; to do which, instead of working off the moulding part, or the face of the mould-board of my plough to straight lines, correspondent to straight lines at right angles, or nearly so, I work it off to fit circular or spherical lines of different radii, and at various angles. To explain which, (see plate,) fig. 1st is a segment of a circle of thirty-six inches radius. Fig. 2nd is a segment of a circle of twelve inches radius. Fig. 3d is a bottom view of the moulding part of my improved plough; including the land-side and shoe, (or heel piece,) with the mould-board and share. Fig. 4, is a right hand side view of a right

hand plough, with a cast iron share. Fig. 5 is a left hand view of a right hand plough, with a wrought iron share.

To shape the moulding part, or make the face of the mould-board.—Suppose it to be for a ten inch (or a two horse) plough, such as would be of a suitable size for turning a furrow slice of about twelve inches. Having obtained a suitable block, I begin by laying off the bottom, see fig. 3, I consider twenty-four inches a suitable length for the land-side, say from *a* at the point to *b* at the heel of the plough. From *a* at the point I draw a circular line with the large segment, fig. 1, so as to intersect a line at right angles to the plane of the land-side at *b*, and twelve inches distant, with the arc of the circle extended out from the plane of the land-side, see *a a a a*. Then having worked the edge of the block off to this line, I turn the block down, and then work the side from *a* at the point, fig. 4; to *a*, at a perpendicular raised twelve inches from the horizontal line, or bottom, and twenty-four inches back from the point of commencement, and vertical to the circular bottom line at that point, with the arc of the circle extended in towards the plane of the land side. Then, having wrought to the shape of this circular line, I apply the small segment, fig. 2, with the arc of the circle extended in towards the aforesaid two lines, and as nearly at right angles with them as is practicable, and then I work off the face of the block so that this small segment will touch the aforesaid two circular lines at various places, corresponding to the lines *c c c c*, &c. so as to produce, as nearly as may be, an equal bearing on all parts of the face of the block. These lines at *c c c c*, &c. would all terminate at a point at *d*, which is about twenty-four inches below the horizontal line, or bottom, of the mould-board, and vertical to the heel, or end, of the land-side. This produces a shape which, (so far as appears,) has not heretofore been applied to any solid. But of those shapes which are known and used, it approaches nearest to the *loxodromic*, or *spiral curve*, although it is not such exactly. But it is a fact that this shape when applied to practice, is found in the operation of raising a furrow slice up, and turning it over, to fit the convex form which it is disposed to assume much more uniformly than any other heretofore applied to that purpose, as is proved by its equal wear over its whole surface.

But this principle may be modified so as to produce a vast variety of different shapes, merely by enlarging or diminishing the radius of either the horizontal or inclined circular lines lengthwise, or, the circle of the segment, which is applied crosswise. After having thus obtained the shape adapted to my purpose, I mould the face of the block in sand, take casts in lead therefrom, and finish the pattern for the mould-board.

Believing that this mode or rule of attaining the proper shape for the moulding part, or what is commonly called the face of the mould-board of a plough, is an original invention of my own, I therefore claim the whole exclusive privilege of making, using, and vending the same, in all the variety of simple changes that may be made conformable to the rule heretofore described.

Second Item. Of the *shape of the throat* (as it is commonly called,)

and the hind part of the mould-board.—See figs. 4 and 5. At *e* I construct this part of my plough with a gentle curve from the top of the share entirely up to the beam, which, at a suitable height for my plough, correspondent to its size, will incline so much forward at the top, as to project considerably over. This is the termination of the fore and top part of the mould-board, the top of which is made so as to form a birth for the beam to rest upon, and be made fast to, and is properly the standard, or sheath of the plough. I also dress off the edge, or fore part of the throat, round, as it ascends from the top of the share, instead of leaving it sharp; and I increase its breadth as it approaches the beam. This is to prevent brambles, long grass, &c. from lapping so short on the throat as they would do if it was left sharp. The inclination forward at the upper part of the throat, forms a curve with the underside of the beam; the pressure from below then naturally forces any such incumbrance up, which then falls off, and the plough runs clear. This I consider an improvement.

The hind part of the mould-board, see *f*, fig. 4, I dress off in a gentle curve from the hind end of the wing of the share, up to the hind corner of the mould-board. This shape answers every purpose in turning the furrow slice, and as it does not come down to the bottom of the furrow, the plough works easier to the ploughman.

Believing that these shapes for the throat, (or fore part,) and hind part of the mould-board, have not been known or used before, I applied them to use; I therefore claim the whole and exclusive right to them.

Third Item. Of the *structure of the land-side*, and the connexion of it with the mould-board, and of the standard, or fore and top part of the mould-board.—In the construction of the plough, I make the land-side thin and broad, see *g*, figs. 3 and 5, which gives strength vertically, with but little weight. This form makes it a guard also, which prevents sods and dirt from working in and clogging that part of the plough. To give the necessary strength sideways, I make a rib on the land-side about midway between the top and the bottom of it, see *h*, fig. 3. This rib I make broad where it joins the mould-board, at *h*, and tapering as it extends back towards the end of the land-side, where there is a birth for the handle of the plough to be fastened on, at *i*, fig. 3, and *k*, fig. 5, I make a projection, or jog, to rise about half an inch, for the end of the handle to rest against. This rest, jog, sustains the pressure of the handle endways, so that the screw-bolt is only required to confine it sideways.

Charles Newbold, in the construction of his improved plough, made the standard, or fore and top part of the mould-board, to pass up through a mortise in the beam. In my plough I make the standard to extend only up to the beam; the top of it I make broad and flat, so that the beam may rest solid on it, and be fastened to it with a strong screw-bolt, which may be made either to pass up through the top of the standard vertically at *j*, fig. 5; or it may pass down through the beam and the standard in an inclined direction, having on the inside of it a birth for the nut of the screw to work on at *j*, fig. 4; this serves the purpose of adjusting the plough. I use also as a swivel on which

to turn the beam to the right or left, by the operation of which, the plough may be made to take more or less land.

Land-sides have been heretofore constructed which were made broad and thin, but they were supported in a different manner. My improvement, therefore, consists only in my mode of making and applying the rib, which gives ample support to the land-side, in every way, and is at the same time entirely out of the way in ploughing. The peculiar shape in which I make the mould-board of my plough, and the manner of bringing the fore part of it up to the beam, causes it to extend further forward under the beam, than the standard of any other plough, which is an improvemeut, because it equalizes the bearing of it. What I claim as my own invention and improvement in this item, is the mode of connecting the land-side to the mould-board by a rib, as here described, with the jog, or rest, on the land-side to sustain the handle; and the extension of the standard forward so much further under the beam than is usual.

Fourth Item. The shoe or heel piece.—In Charles Newbold's improved plough, a bar of wrought iron extended from the wing of the share, back to the end of the land-side, and lay flat on the under part of it, and was fastened on with a screw-bolt passing up through both. The Messrs. Stevens, of New York, in the construction of their improved plough, patented in 1820 and 21, applied a shoe, or heel piece, on the bottom of the land-side of their plough, which they fastened on by extending an ear, or projection up and on the inside of the land-side, with a small screw-bolt passing through both. Shoes of such construction, however, will only protect the bottom of the land-side, whilst the side, though quite as much exposed, is not protected at all. To obviate this inconvenience, I make a counter sink, or groove, on the outside and lower edge of the land-side of my plough, which forms a birth for the shoe, and admits of thickness enough for the substance of the shoe, without any inconvenience from its projecting out, see *k k*, figs. 3 and 5. I make the shoe to extend round and under the bottom of the land-side, and fasten it on with a small screw-bolt. By which means, the shoe thus constructed protects both the side and bottom of the land-side. The shoes may be cast in metallic moulds, the chill serving to render them hard; or they may be made of wrought iron, or of steel. The improvement which I claim in this item, is that of constructing the shoe so that it will protect both the side and bottom of the land-side; and I also claim the making the cast iron shoe in metallic moulds.

Fifth Item. My mode of *making, applying, and using the share of the plough*, whether made of wrought or cast iron.—If I apply the wrought iron share, I make it partly in the usual way, by welding the wing of the share on the land-side, see fig. 6; but I make the bar to extend back of the wing some two or three inches, as at *m*, and fasten it to the land-side with a small screw-bolt at *n*, fig. 5. I then fasten the wing of the share to the mould-board with a strong screw-bolt, having the head of it made to fit a tapering hole in the mould-board, and passing down through the wing of the share at *p*, fig. 6, and drawn tight by a nut. If it be a right hand plough, this should

be a left hand screw; and if a left hand plough, then it should be a right hand screw.

The point and edge of the share may be made in the common shape, but those shapes represented at figs. 3, 4, and 6, I think much more useful, whether made of wrought or cast iron. If a plough works well, the point of the share is disposed to wear off round. Hence, I make the point of the share round; I also make it about twice the common width, and much thinner. Shares of this construction, whether made of wrought or cast iron, wear more uniformly than others, and being so much thinner, they wear longer, and work better, at the same expense.

If I apply a cast iron share, I make a counter sink on the lower and front part of the mould-board, as at *q*, fig. 4, and at *s*, fig. 3, on which I fit the share somewhat in the manner in which Richard B. Chenoweth, of Baltimore, fitted the share on his improved plough, patented in the year 1808, but with some alterations and improvements. Although the point and edge of the share could, in his plough, be extended forward, still the desired effect was not produced. The point and edge will naturally wear to a bevil on the under side, and it was owing to this circumstance that the share would not penetrate the ground, and not because it wanted more length. In order to adapt the point and edge of the share to my principle of adjustment, that is, so that it may be set deeper and more bevilling as the under part of it wears off, I fasten the share on my plough with a single screw-bolt, although two or more may be used, and when first put on, I lay between the lower edge of the mould-board and the under side of the share, a small piece, or strip, of some soft wood, as at *s*, fig. 3. This strip may be about one-fourth of an inch thick at, or near, the point of the mould-board, and taper off to an edge at the other end, and about half or three-quarters of an inch in width: it, however, should be made of such thickness as to set the point and edge of the share level with the after part of the plough. The effect of this, in use, is that, as this strip of wood is somewhat elastic, it has a tendency to diminish the sharpness of the stroke, which otherwise would be produced if the castings were to come together. But the great advantage is, that it affords an opportunity of adjusting the point and edge of the share, so that when it has worn to a bevil on the under side, the piece, or strip, of wood may be taken out and a thinner one put in, or it may be removed entirely. The cast iron share, thus constructed, will wear a great deal longer, and do more and better work than cast iron shares heretofore in use. In making the cast iron shares, I also sometimes use a different process, that is, instead of moulding the pattern of the share wholly in sand, I make one part of the mould of metal; the effect of which is that the shares are sufficiently chilled to render them hard, the metallic part of the mould being applied to the upper surface of the share, the wearing part of it is rendered clean, hard and smooth, which lessens the friction. This mode also saves nearly one-half the labour in moulding, and of course the shares are cheaper. Now what I claim as my invention or improvement in this item, is my mode of making, and manner of applying and using

the share of the plough as here described, whether made of wrought or cast iron.

Sixth Item. My mode of *stocking* and manner of *using* the plough. —Formerly it was the practice to make the beam immoveably fast to the standard and the land-side handle, whatever may have been the mode of fastening adopted; but Charles Newbold, in the stocking of his plough, constructed it so that the fore end of the beam could be raised or lowered by the use of the key, or wedge, at the standard, but it could not be moved sideways, and the hind end of the beam was made fast in a mortice in the land-side handle. This, I believe, was the first attempt at adjusting the set of a plough by altering the stock. Though he did not describe this circumstance in his specification, he informed me that such was the fact. But since that time there have been various modes adopted of raising and lowering the beam of the plough at the standard, by screws, keys, wedges, &c.

In the stocking of my plough, I begin by making the land-side handle fast to the inside of the land-side, as at *k*, fig. 5. I then fit the beam on a block of wood, of about one inch in thickness, laid on the top of the standard, as at *u*, figs. 4 and 5, and then I make the hind end of it to lay fair against the inside, or outside, of the handle, as at *w* figs. 4 and 5. I then make the beam fast on the standard, with a strong screw-bolt, either passing up through the front part of the standard and the beam, as at *j*, fig. 5, or by passing a screw-bolt inclined down through the beam and the standard, as at *j*, fig. 4. Either of these modes will permit the beam to move on the top of the standard in the manner of a swivel, so that I can move the fore end of it to the right or left at pleasure. The hind end of the beam I then make fast, by a screw-bolt, to the inside or outside of the land-side handle, as at *w*, figs. 4 and 5. Thus affording the ploughman an opportunity of *adjusting the plough.* If the plough is disposed to work too shallow, it may be set deeper by merely putting a piece of leather, or wood, between the top of the standard and the beam, or, rather, the block under the beam. If the plough should work too deep, it is adjusted by taking some off the block. By the use of this mode of adjusting the plough, it may very soon be altered to work after either horses, mules, or oxen.

I fasten the other handle to the mould-board with two small screw-bolts, as at figs. 4 and 5. The two handles I connect together with two rounds, see *w w*, figs. 4 and 5. Thus framed, if it is desired to set the plough more to land, I loosen the upper screw-bolt, by which the handle is fastened to the mould-board, and drive a wedge between the handle and the mould-board, as at *z*, fig. 5. If the plough should take too much land, then I loosen the lower bolt, and drive a wedge between the lower end of the handle and the mould-board. If I wish to set a two horse plough to work after three horses abreast, then I loosen the beam from the handle, and put in a block of about two inches thick, as at *w x*, fig. 5; the thickness of the block must be adjusted by practice. The end of the screw-bolt, which confines the end of the beam, the block, and the handle together, must then have

a brace applied, which I make fast upon the handle, fifteen or eighteen inches above. If required, the plough may be made to work after the team walking on the sward, or turf, by the side of the open furrow, and still to run well; the only alteration required being to put in a thicker block between the handle and the end of the beam. This has been done in marshy land, where the animals could not walk in the open furrow. The only use of the block which I put under the beam of my plough, and on the top of the standard, is that it raises the beam that much higher from the ground, and affords an opportunity of continuing the curve of the throat of the plough, in a more complete form than could otherwise be given.

What I claim as my improvement in this item, is my mode of applying the beam to the standard; and my manner of raising and lowering it on the standard; and my mode of fastening the end of the beam on the side of the handle, together with that of adjusting the fore end of the beam, by turning it to the right or left, and of making the hind end of it fast to the handle higher or lower; the application of the block between the beam and the standard, and the beam and the handle.

Seventh Item. Of the Coulter.—If I apply the locked coulter, I put it on a nib on the point of the share, which of course must be made of wrought iron. The only difference in my mode of applying the locked coulter to the plough, from what has been common, is that instead of making a mortise in the beam for the upper end of the coulter to pass through, I make the mortise on the land-side of the beam, by putting on a block of wood with a place cut out in it, which forms a mortise by the side of the beam; this block I fasten on with screw-bolts, and, of course, I can give the coulter any inclination back that may be required, and fasten it with wedges in the usual way.

The advantages of applying and using the locked coulter in this way is, that it sets the top of it to lean a little over to the land, which causes it to detach the furrow slice more easily than it would do if it was set vertical, or inclined a little over to the furrow; but having satisfied myself, by actual experiment, that it requires an increase of twenty-two per cent., or more, of power in the draught with a locked than with a sward coulter properly fitted to it, my attention has been principally directed to the latter; but this I apply in a different manner from any heretofore in use. Instead of putting the coulter through a mortise in the beam, I apply it to the side of the beam, see *y*, figs. 4 and 5. To fasten the coulter, I have holes made through its shank; I then put a strong screw-bolt through the beam and the coulter at whatever hole is best suited to my purpose. I then put a strong iron strap on the outside of the coulter, having a hole in it for the screw-bolt to pass through, all of which I draw hard up with a nut; then, having the lower end of this strap made square, or round, and somewhat tapering to the end, I bend it back behind the coulter, and round in front of the standard. Thus fitted on, if the coulter rests solidly against the side of the standard, and fair against the beam, the effect is, that the point of the share, when at work, runs

from two to three, and sometimes five or six, inches in advance of the edge of the coulter, by which means it has the sward so much raised, and strained, that the edge of the coulter slits it open in the easiest manner possible.

That which I claim in this item as my improvement, is the mode of applying the coulters to the side of the beam, instead of through a mortise in it; and, more especially, the particular manner of fastening the sward coulter to the plough, and using it, so as not to cut the sward until the point of the share has raised it up so as to have it on a strain.

GIDEON DAVIS.

¶ List of French Patents.

A List of Patents for Inventions, Improvements, and the introduction of Foreign Inventions or Improvements, granted in France during the third quarter of the year 1831.*

[TRANSLATED FOR THIS JOURNAL.]

[Continued from p. 192.]

Peter Lieutaud, and J. J. Hyp. Bicard, August 29th, (15 years.) A flour mill, with a conical mill-stone. (P. Invent.)

A. Lombardon, ex-magistrate, Marseilles, August 6th, (5 years.) A pump which gives a constant stream. (P. Invent.)

Ch. Ang. Lupé and Lewis Joseph Salmon, Paris, August 29th, grantees of Peter Augustus Lupé, of a ten years' patent for an invention; viz. for a method of restoring to animal black, which has been used to discolour sugar, the discolouring properties lost in that process. (P. Improv.)

Andrew Marouy, Paris, September 10th, (5 years.) A new three wheeled harrow, in which the axle of the fore wheel turns freely in a horizontal plane, in any required direction. (P. Invent. Improv.)

Matthew de Dombasle, Roville, Department of the Meurthe, August 1st, (15 years.) An apparatus for what he calls decocting process, to be used in extracting sugar from the beet. (P. Improv.)

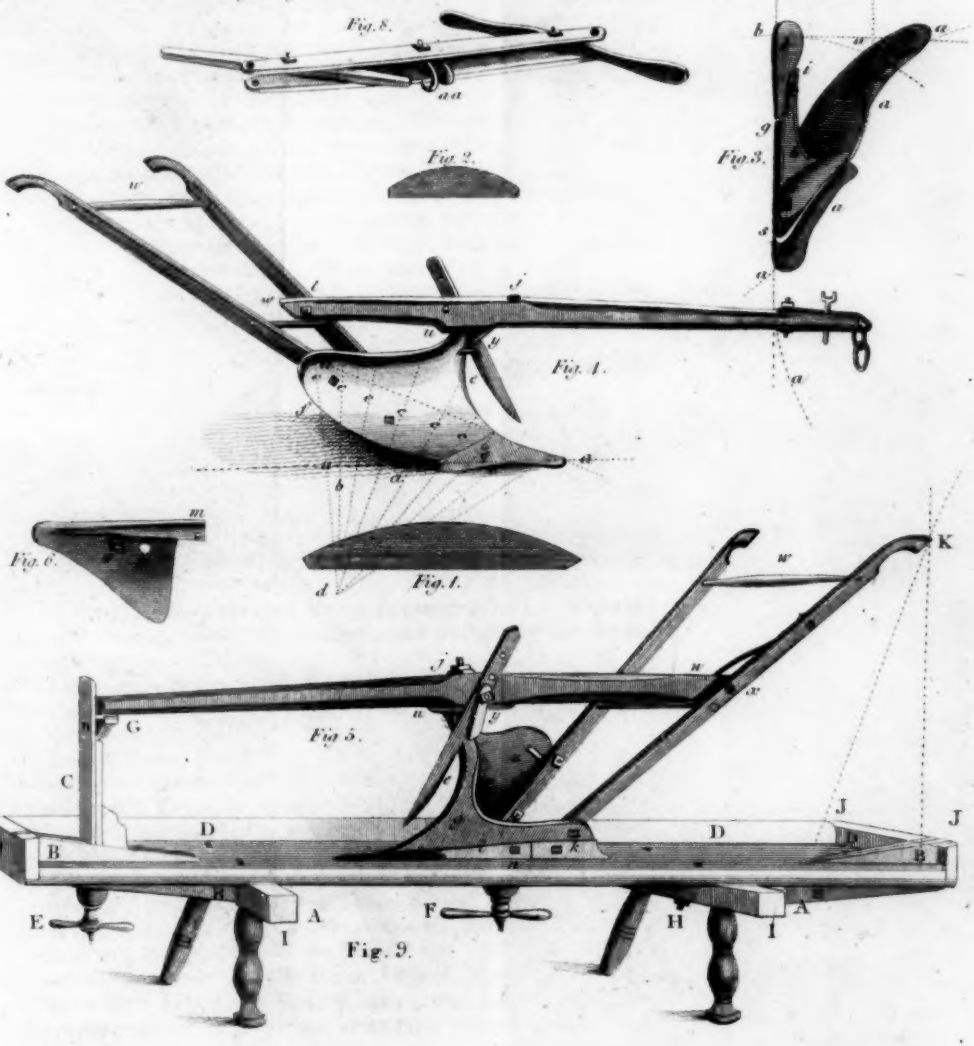
Berry Miller, of London, represented at Paris by Perpigna, August 6th, (5 years.) An improved pedometer. (P. Import. Improv.)

James Milligan, England, represented at Paris by Truffaut, August 1st, (15 years.) An apparatus to regulate the temperature in the processes of evaporation, distillation, &c. (P. Invent. Import. and Improv.)

Ant. Morateur, wheelwright, and Francis Thibaudon, turner, Ly-

* P. Invent. denotes patents for inventions. P. Invent. and Improv. patents for invention and improvement. P. Improv. Patents for improvement. P. Import. Patents for importation, or the introduction of foreign inventions and improvements.

Improvements in the Plough, Double & swingle trees and Plough Bench by Gideon Davis of George Town District of Columbia N. America.



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ons, August 22nd, (5 years.) A process for conveying, by a constant oblique, or vertical, ascent, a stream of water four inches in diameter, to the tops of the highest buildings, and even of mountains, when the elevation is not very great, by the aid of pumps worked by the wind. (P. Invent.)

Phil. Mousset, mechanician, Lyons, August 22nd, (5 years.) A machine to wind silks. (P. Improv.)

William Newton, Engineer, London, represented at Paris by Perpigna, August 6th, (10 years.) An improvement in the touch-holes, &c. of percussion guns. (P. Import. Improv.)

Onesiphorus Pecqueur, mechanician and engineer, Paris, August 29th. A new arrangement of a steam engine, and a new system of boilers, adapted to the manufacture of sugar from the beet, and to the refining of sugars in general. (P. Improv.)

P. T. Fl. Pepin, Paris, August 6th, (15 years.) A machine for shelling grain, berries, seeds, &c. and for making shelled and pearl barley. (P. Invent. Improv.)

Ant. Remi Polonceau, inspector of roads, September 10th, (15 years.) A system of bridges. (P. Improv.)

J. Ser. Poullot, Paris, August 16th, (15 years.) Processes for manufacturing compound combustibles. (P. Invent.)

Raingo, brothers, watch-makers, Paris, August 22nd, (10 years.) An addition to the patent granted to M. Sorel, whose grantees they are. A new system of steam engine. (P. Improv.)

A. J. H. Rendevhagen, Paris, July 13th, (10 years.) Military and common trunks, wagons, military tents, portmanteaus, &c. (P. Invent.)

J. A. Robert, medical student, Paris, September 10th, (15 years.) A kind of fire arms, loaded at the stock, and cocked by the motion of raising the piece. (P. Improv.)

P. M. B. Robin, sea captain, Rochefort, represented at Paris by Mathieu, August 29th, (15 years.) A mechanical lock, with concentric cylinders. (P. Improv.)

P. J. Rouen, Paris, August 16th, (10 years.) A hydraulic balance regulating the course and action of liquids and fluids. (P. Invent.)

Urbin Sartoris, Paris, September 10th, (15 years.) An improvement applied to the flood gate boat, patented by him on the 25th of March, 1826. (P. Invent. Improv.)

L. V. A. Sire and C. A. J. Girardot, represented by Mr. Aneglier, at Vesoul, Department of the Haute, Saone, August 22nd, (10 years.) For a single cylinder roller, for the manufacture of biscaian guns, balls, and other articles hitherto moulded. (P. Invent.)

Aut. Dom Sisco, mechanician, Paris, August 6th, (5 years.) An instrument which he calls a setting spring box, containing all the tools necessary to put up fire arms, or to take them to pieces. (P. Improv.)

C. H. Story, Paris, August 19th, (10 years.) A window impermeable to wind and water. (P. Invent. Import.)

Taillepied, Paris, August 29th, (5 years.) Processes for obtaining and using a concentrated and moveable power. (P. Invent.)

Phil. Taylor, civil engineer, at Beau Grenelle, Department of the Seine. A grantee of the patent taken out by M. Mackintosh, August 16th, (10 years.) A method of improving the process of combustion, by imparting a more powerful draught. (P. Invent.)

Phil. Taylor, civil engineer, at Beau Grenelle, Department of the Seine, August 29th, (10 years.) A new gasometer. (P. Import.

Touron & Co., represented at Paris by Coreil, August 1st, (5 years.) Processes for printing hair stuffs, with permanent colours. (P. Invent. Improv.)

V. P. Triquet, piano manufacturer, Paris, July 18th, (10 years.) An improvement in the construction of pianos. (P. Invent. Improv.)

Andrew Et. Trompette, Paris, September 10th, (10 years.) A new method of hanging gig boxes. (P. Improv.)

Fr. Baris Vouillemont, at Joinville, represented at Paris by M. Armonville, August 6th, (10 years.) A new and simple plough, in which the stock and share are cast in one piece. (P. Invent.)

John Zuber & Co., manufacturers of coloured paper, Reixheim, Department of the Upper Rhine, August 29th, (15 years.) A machine for manufacturing the continuous sheet paper, and an apparatus for drying, dressing, and preparing the same. (P. Improv.)

Recapitulation.—During the third quarter of 1831 were granted, in France, seventy-seven patents.

¶ TRANSLATIONS FROM FOREIGN JOURNALS.

*On the art of Glass Blowing. By Lafonde.**

[Translated for this Journal.†]

The progress of the art of glass blowing is naturally connected with the improvement in physical and chemical science; this is especially true in relation to chemical science, the remarkable epochs in which have produced corresponding changes in this art, which is an important auxiliary to that of the chemist.

Previous to the important era marked by the labours of Lavoisier and his successors, the art of glass blowing, as connected with natural science, scarcely existed, and in the older works we find the various operations now commonly practised scarcely noticed.

The operations of the art were then limited to four,—to sealing, bending, and soldering, and to blowing a bulb. The perfection to which this art has now been brought, in its application to the construction of chemical implements, entitles it to be numbered among the mechanical branches which should be acquired by every practical chemist.

* Journal des Connaiss Usuelles, No. 91.

† By request of the Committee on Publications.

Even chemists who reside in cities are not always able to obtain readily, the instruments which they may need, and have repeatedly acknowledged the advantage to be derived from an acquaintance with this art.

The reason of this is easily explained; the very moment at which the idea of a new piece of apparatus, or of a modification of an instrument, presents itself to the mind of the chemist, is the very time at which he should realize his conception. If he is obliged to leave his laboratory, with his experiment half finished, to apply to a workman, who can rarely be induced to quit his ordinary routine of work, precious time must be lost in procuring what a little practice would have enabled him to make in a very few minutes.

The difficulty would be still greater if a new instrument was to be made. Every one who has had his ideas carried into effect by ordinary workmen, knows the vexation and disappointment attending the execution, and that it is much better to devote a portion of the time, which would otherwise be disagreeably spent, in enabling himself to construct the required apparatus.

If it is agreeable and even useful to those who are, so to speak, at the fountain head, to possess this art, it is *essential* to those who do not enjoy such an advantage. The convenience of being able, with a set of tubes, and an instrument essentially portable and handy, to construct any piece of apparatus which may be wanted, is too obvious to need illustration. It might happen that the article required is too fragile to be conveyed from the place where it might be procured, and thus the art becomes indispensable.

This art enables the lecturer on natural philosophy to furnish his cabinet, at a trifling expense, with many instruments, which, if made of metal, would be costly. The transparency of the glass articles is decidedly an advantage, enabling pupils to perceive at a glance the play of a machine which, if made of metal, would require a long explanation from the lecturer.

Most of the apparatus used in electrical experiments, as electrometers, &c. are, when of glass, decidedly superior to those of metal, as they are insulated without any special arrangement for the purpose.

It would be tedious to enumerate the many instruments with which the art of glass blowing may furnish the analyst. Apothecaries, not residing in large towns, if possessed of this art, will not be without Welther's tubes, which are frequently so difficult to obtain.

Finally, the proprietor of a manufactory, who must have a laboratory for the analysis of the materials which he procures from the market, and of the products with which he furnishes it, and who is generally at a distance from large cities, will especially feel the necessity of mastering an art which will enable him to provide himself with the instruments which he may require, without the assistance of the skill of others.

The fragility of glass instruments is an objection which may be urged against them, but the facility with which the broken articles may be replaced, and the trifling cost of the materials, is more than

sufficient to remove that objection, and the art of glass blowing may be reckoned among the most useful of arts to those engaged in chemical pursuits.

Success in the construction of glass apparatus requires two kinds of knowledge, the one relating to the choice of materials, which will be treated under the head of "the choice of Glass." The other relating to the mode of making the apparatus, which may be thus divided:

1st. Of the elements of which different articles and apparatus are formed.

2ndly. The construction, properly so called, or the manner of putting together the several pieces composing a piece of apparatus, with reference to the order of the succession in the different operations.

On the Choice of Glass.

As glass tubes are, with few exceptions, the only articles of glass which are used, our special attention should be directed towards this form of the material. In the choice reference should be had to two things, to the dimensions and quality.

The length, size of the bore, and thickness of the tube, must, of course, be determined by the dimensions of the apparatus to be made; but it is essential that the thickness of the tube shall be the same in the parts which are to be worked.

An example which will show the necessity for this, is afforded by one of the commonest operations, that of blowing a bulb. Suppose the tube which is to be used is unequally thick; if, after heating it moderately, we try to blow a bulb upon it, the thinnest parts being most thoroughly heated, and therefore most softened, will yield easily to the pressure of the breath, while the thicker ones being less heated, and consequently distending with more difficulty, will not only produce irregularities in the form of the bulb, but by the inequalities in thickness at different points, will render the instrument liable to break by sudden variations of temperature.

If the glass be heated for a long time, so as to bring the thickest parts towards the point of fusion, they will, on account of their greater mass, distend more than the thinner parts, and thus produce a result entirely similar to that explained in the last paragraph.

After a proper diameter has been selected for a tube, we should take care that this diameter be uniform throughout the length of the tube, that the surface be entirely free from knots, or small globular projections, and more especially that the thickness be perfectly uniform.

The selection of tubes with reference to the quality of the material, is a more difficult task. Habit enables the eye to distinguish between the very good, the medium quality, and the bad glass. There are, however, a few characters which have seldom deceived us, and which we give, therefore, as guides.

Some tubes, when viewed by reflection, present a dull bluish opaline tint, mixed with the usual light green colour. This glass seems to contain lime, it softens with difficulty, and hence requires long

exposure to the flame, in which it acquires a dark hue that disfigures the apparatus made with it. The thickness of such tubes is always great in proportion to their diameter.

The other tubes are usually thin, and are white, with a slight shade of pink. Their fusibility renders them difficult to work, by those who are not very well skilled in the glass blower's art, and their use will defeat the attempt to make most of the apparatus which requires that they should be soldered to tubes of a different quality.

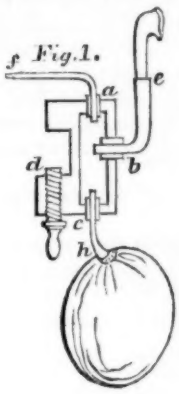
A defect to be found in certain tubes, and which we will merely indicate, not being able to furnish any sure test for recognising it, is that of losing their polish when heated. To avoid this description of tubes, which, however, are not common, we would recommend that all the operations required in the construction of a piece of apparatus should be gone through before soldering the parts together.

To sum up, in relating to the selection of tubes,—a good tube should have a light green colour, it should be easily divisible by the cut of a file, and present a smooth section of a fine green colour.

The Lamp.

We come now to the different modes of heating the glass to the required temperature. In instruments for this purpose a lamp, more or less like the enameller's lamp, is used, the mode of producing a blast being different in each. The eolipile throws a jet of the vapour of alcohol from a metallic globe heated over a small lamp; and the enameller's table furnishes a blast of air by a double bellows, placed under the table, and moved by the foot of the operator.

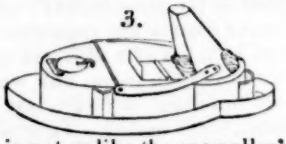
Fig. 1.



The apparatus which we consider best, and which we shall, therefore, carefully describe, is that invented by M. Danger. It consists of a wooden vice, *a b c d*, fig. 1, which by the aid of a screw, *d*, can be fastened wherever it may be convenient. Through the axis of the vice passes a cylindrical cavity *a c*, to the upper orifice, *a*, to which a metal or glass tube is to be fixed to give the required blast; to the lower aperture, *c*, is to be fastened one of the ends of the tube *c h*, to which a large bladder is connected at *h*. At *b* is seen the end of another duct at right angles to the first; to this duct is fitted a curved tube *b e*, through which air from the lungs is introduced into the bladder. The tube *b e* is contracted at *b*, as shown by fig. 2.. To this contraction, forming a conical cavity, with its base at *a*, is adapted a conical valve of cork, *a c*, which is confined by a peg, *d e*, to prevent it from rising too far.

The bladder being squeezed between the knees, the air introduced into it presses on the base of the cork valve, forcing it against the sides of the tube, which is thus stopped. The cork should be greased with a little tallow, to make the valve tight. The tube being thus closed, the air passes to *a*, fig. 1, escaping by the jet pipe.

3.



The lamp, fig. 3, is not unlike the enameller's lamp; the principal improvement consists in a cap in the shape of a truncated cone, which can be placed over the blazing part of the wick, contributing to the ignition of the smoke, and preserving the flame from the influence of currents of air, which would otherwise make it unsteady. This cap has near its base two openings; the smaller aperture serves to admit the air; the larger allows the flame to escape.

No better wicks can be had than those which the operator may make by winding unbleached knitting cotton to a suitable length. The two wicks used should weigh together an ounce and a half, and care must be taken to keep them always separate.

The glass blower takes his seat at the table, where his instrument is fixed; places the jet pipe in the direction of the two apertures of the cap of the lighted lamp; and blowing through the tube *b e*, fig. 1, fills the bladder with air; he then presses the bladder between his knees, producing a blast which is directed through the flame.

Two kinds of jets are used, according to circumstances; the one is slender and pointed, and resembles that produced by the mouth blow-pipe; it affords, like that jet, an oxidizing and deoxidizing flame. A slight pressure of the knees only is required to supply this jet. The other jet is of a variable size, but always larger than the first, and requires a stronger pressure. In the first, the jet pipe passes between the wicks of the lamp; in the second the extremity of the jet touches the first orifice of the cap.

The blast-pipe, bladder, and tube, for filling the bladder with air, are fixed in their respective openings by corks.

Having explained the manner of putting together the apparatus for glass blowing, we proceed to treat of the several operations, premising a few rules which should be strictly adhered to.

1. Never to heat a piece of glass beyond the temperature requisite for the result to be obtained.

2. Never to work a piece of glass when damp.

3. Never to transfer a piece suddenly from cold air to the flame, or, vice versa, but to remove it from the flame gradually, in order to anneal it.

4. To keep the piece constantly in the flame, until its withdrawal is required by the operation to be performed upon it.

5. To complete as far as possible, all the pieces composing an apparatus, before soldering any two together.

6. To turn the pieces round continually in the flame, when their form allows it, and always in the same direction.

7. Never to inflate the bladder from the lungs, but with the air which the cheeks when inflated can contain, and which furnishes always an adequate supply.

First Operation.

Rounding the Edge of a Tube.

1. This operation, to which, from its simplicity and frequent occurrence, we assign the first place, consists in smoothing and polishing the sharp edges of a tube that has been cut by a file, by raising the edges to the melting point.

For this operation the small jet is used. Holding the tube in the left hand, between the thumb and the forefinger, with the little finger bent under the tube to steady it, place it over the flame, at the point of greatest heat, which is two-thirds the length of the flame from the cap, a little beyond the tip of the blue. Turn it then, sliding it between the fingers, the thumb bearing it upwards, and the forefinger downwards; holding it so that only a small portion of the circumference may be heated. The reason for this precaution is easily seen, since were all the points of the section at once submitted to the action of the heat necessary for rounding the edges, the edges of the tube would tend to approach each other, and the orifice would contract so much as to become obstructed. When, after a few turns, the edges have become smooth, the operation is terminated.

All tubes that are to be corked, ought to be edged. We shall point out, in what follows, those cases in which edging is required in the construction of instruments.

Widening a Tube.

2. The tube being edged, heat the edges by a small jet of about a line in diameter, then by means of an iron rod, fig. 4, about six inches long, and half an inch in diameter, fixed in a handle, and terminated by a cone, begin the widening; turning the tool with the right hand, in an opposite direction to the rotation of the tube, gradually introducing the cone as the tube gives way. The tool should be held so that its axis and that of the tube may coincide.

[to be continued.]

Stopcock for Glass Plates.

A new kind of stopcock has been submitted to the Society for the Encouragement of National Industry; it is made of two perforated

glass plates, sliding one over the other, and is applicable to any machine containing either liquids or gases.

As in all similar contrivances, when the perforations, of which there is one on each plate, coincide, the confined substance escapes, and when they do not, the communication is cut off.

[*Bulletin de la Soc. d'Encouragement, &c.*

Ivory preserved from becoming yellow.

To preserve the whiteness of ivory, it is essential that it be exposed neither to air, dust,* nor smoke; but neither metal nor wooden cases afford sufficient protection. The author has known delicately wrought ivory instruments enclosed in covered boxes, to become yellow in a short time, and the same has occurred in wooden and metallic cases. Glass alone possesses the requisite properties for preserving it.

Bell glasses, ground at bottom, or when the object to be protected is of considerable size, square cages of glass answer every purpose.

Even metal cases with glass doors are insufficient for the purpose. Few can be obtained impervious to dust, and even when such are found, they are ineffectual for preserving the ivory free from *colour*, for its whiteness is retained only on the side exposed to the glass. Of this, the author's own experience has convinced him. In the Royal Cabinet at Copenhagen, there is in a case of the kind mentioned, a large ivory vase, ornamented with sculptured figures, the work of the Danish artist Jean Hollaender. This exquisite piece of workmanship had been placed against the glass, and apparently had not been disturbed for a number of years. On turning it round, the side which had not been exposed to the light was found of a brown colour.

[*French translation of a Danish memoir. Recueil Indust.*

¶ *Selections from Lectures on Pottery, delivered before the Royal Institution, London, by* A. Aikins, F. L. S. F. G. S.

(Continued from p. 204.)

Vitreous glazes, whether employed simply for closing the pores of baked clay, and thus rendering it impermeable to water, or with the farther intention of concealing the coarseness and bad colour of the body by a covering of enamel, appear to have originated in China; for the earliest European travellers in that country make mention of temples covered and encrusted by varnished tiles of various colours.

The articles of delft ware, for which there still continues to be an effective demand, are plain white tiles for dairies and for lining baths, pomatum pots, and a few jugs, and other similar articles, of a pale blue colour.

* Dust is very injurious; it becomes fixed in the pores, diminishes the brightness, and roughens the surface of the ivory. Its removal is besides difficult, on account of its fineness.

The material employed is calcareous clay, or marl, of a blue, red, or yellow colour, from the neighbourhood of Maidstone, and therefore probably belongs to the deposit called the Weald clay, which lies below the green sand. The first process which it undergoes is that of grinding with water, and passing it in this state over fine sieves, in order to separate the coarser particles. The excess of water is then dried off, by exposing the fine mud to spontaneous evaporation in shallow tanks or pits. While still in a soft state, it is beat up by hand, and then heaped up in a cave or clay cellar (as it is technically called) till wanted. The longer it remains here, the more tenacious and plastic it becomes. It is then tempered for use by passing it through a pug-mill, or is kneaded by treading; the addition of sand of every kind being carefully avoided. The ware is formed in the usual way, then dried, and afterwards placed in the arch of the kiln to burn into biscuit. It is now of a pale buff colour, the lime in the clay having combined with the oxide of iron, and thus preventing it from exhibiting the red colour which is natural to it, and which it possesses when combined with sand or with mere clay. The glaze is thus formed: Kelp and Woolwich sand are calcined together under the kiln till they combine into a spongy, imperfect glass or frit; lead and tin are calcined together till they form a grayish white powdery oxide, called by the potters tin and lead ashes; the frit is then ground dry, and afterwards mixed with the ashes, a little zaffre being added if a blue tint is required, and arsenic if the glaze is intended to be white. The composition being well mixed dry, is put in the hottest part of the kiln, where it runs into a vitreous opaque enamel. This latter is then ground under a heavy runner of iron, and is finally mixed with water, and rubbed between stones to the consistence of cream. The biscuit, rendered bibulous by drying, is then dipped in this cream, and a sufficient quantity of glaze adheres to the surface of it. The ware is next dried, packed into saggars, which are boxes of clay, to prevent it from being injured by the smoke; and these saggars are piled in the kiln. A heat, moderate for the first twelve hours, and stronger for the last twelve hours, is applied, which vitrifies the glaze on the surface of the ware, and thus completes the process.

As the use of the delft pottery was superseded by the earthenware of Staffordshire, it might seem more natural for me to pass to the description of this latter, rather than to the subject of porcelain. But the European imitations of the Chinese porcelain have introduced so many modifications in the manufacture of the finer kinds of earthenware, that the line of distinction between them has become almost evanescent; and I think it will conduce to the clearer understanding of that part of my subject which yet remains to be illustrated, if I begin with the porcelain of China.

The introduction of the Chinese porcelain soon excited a strong desire in the various countries of Europe to imitate it; but as the establishment of experimental manufactories for this purpose required the expenditure of considerable sums, and at a risk beyond the means of private persons, it is chiefly to the munificence of the sovereigns of

Europe that the public are indebted for the first steps made in this interesting art. In Germany chemists and mineralogists were set to work; the latter to seek for the most appropriate raw materials, and the former to purify and to combine them in the most advantageous proportions. The French government adopted the very sensible plan of instructing some of the Jesuit missionaries, who at that time had penetrated to the court of China, and into most of the provinces of that empire, to collect on the spot specimens of the materials employed by the Chinese themselves, together with the particulars of the process. The precise result thus obtained is not known; for as a considerable rivalry existed between the different royal manufactories of this ware, the most valuable information would of course be kept as secret as possible. The most detailed account hitherto given to the public, is that collected by the Père de Entrecolles, and printed in the *Arts et Métiers* of the Royal Academy of Paris, of which I shall give an abstract.

There are three materials employed in forming the body of Chinese porcelain, but all the three are never used at once.

The first is called *petuntse:* it contains scattered shining particles, is fine-grained, and is quarried from certain rocks. It is prepared for use by first breaking it with hammers, then grinding it in mortars with iron pestles, and lastly, is washed over, taking only the white creamy matter that floats on the surface, which, after being dried and pressed into small cakes, is fit for use.

The second material is called *kaolin*, and appears to be porcelain clay, namely, that which results from the decomposition of felspar. It is described as occurring in lumps in the clefts of mountains, covered with a reddish earth. It is prepared for use exactly in the same manner as the *petuntse*.

The third material is called *hoaché;* it is used instead of *kaolin*. It has a smooth, soapy feel, and no doubt is either steatite, or soapstone, or agalmatolite. It is prepared for use exactly in the same manner as the preceding. Porcelain made with this latter is much dearer than that made with *kaolin*. It has an exceedingly fine grain, and is very light; but, at the same time, is more fragile, and it is not easy to hit on the precise degree of heat that suits it. For the finest porcelain, four parts of *hoaché* are added to one of *petuntse*. Sometimes the body of the ware is made with *kaolin;* and then the article, when dry, is dipped in the *hoaché*, brought to the consistence of cream: what adheres forms a thin layer, on which, when dry, are laid the colours and the glaze; and thus a porcelain finer than the common is obtained. *Hoaché* is also laid with a pencil, before glazing, on those parts of the common porcelain that are intended to have an ivory white colour.

For the fine *kaolin* porcelains, equal parts of that substance and of *petuntse* are employed; for the less fine, two parts of the former and three of the latter. The ingredients being put together in due proportions, the mass is carefully tempered and kneaded by hand, and then the ware is wrought on the wheel, or, for articles of irregular figure which cannot be thus formed, is made by pressing the compo-

sition into moulds, and then uniting the several pieces by moist clay. The piece being formed is very carefully dried, and is then covered with the glaze. The white semitransparent glaze is thus prepared: The whitest *petuntse* with green spots is pulverized and washed over, as already described; and to one hundred parts of the cream thus obtained, are added one part of *che-kao* (burnt alum,) previously pulverized. A caustic potash ley is also prepared, into which *che-kao* is stirred, and the cream thus produced is collected. The two creams are then mixed together in the proportions of ten measures of the former to one of the latter. This composition it is which gives to porcelain its whiteness and lustre.

A brown glaze is made of common yellow clay, washed over, and brought to the consistence of cream, and then mixed with the former glaze. If the brown glaze is not to cover the whole of the surface, wet paper is laid on the reserved parts, which, after the glaze has been put on and has ceased to be fluid, is removed, and such blank parts are then painted in colours, and covered with the common white glaze.

When the glaze is thoroughly dry, the ware is put into the furnace for the first time; whence it appears that the ware is never in the state of biscuit; a circumstance in which the process materially differs from that adopted by, I believe, all the European manufacturers, who never put on the glaze till after the first firing of the ware.

The flux used with those colours that are laid on over the glaze is made of quartz, calcined and pulverized, and then mixed with ceruse, in the proportion of one of quartz to two of ceruse.

Red is given by peroxide of iron, produced by calcining green vitriol; and a finer red is made of copper, but the particular process is kept secret.

The enamel colours are tempered to the proper consistence by a solution of glue, except those into the composition of which the ceruse enters; these latter are tempered only with water.

Such, in few words, is nearly all that is publicly known of the manufacture of porcelain in China, except the mode of packing the ware in saggars previous to firing, and certain other mechanical details not likely to be of general interest.

On the preceding description I shall hazard a few remarks, being at the same time sensible how likely one not practically acquainted with the manufacture is to fall into error.

In the first place, I think it may be doubted whether the petuntse of the Chinese is a granular quartz or siliceous sandstone, as it is commonly supposed to be. I do not lay much stress on the green spots said to characterize the most valued varieties of this substance, though this colour is of very rare occurrence in sandstones, but by no means uncommon in the porphyritic varieties of compact felspar, so abundant in many parts of North Wales, and of Cumberland and Westmoreland. In the next place, sandstone, however finely pounded, will not form a cream on the surface of water into which it has been stirred, but will subside almost immediately; whereas, if compact felspar is treated in the same way, the finest of the particles will

be brought almost to the state of clay, and will form a cream when stirred with water. That my statement respecting comminuted felspar passing in no great length of time to the state of moderately plastic clay is correct, I may appeal to the experience of every one who has observed how soon the granite fragments which are laid on the streets in London, get bound together by a meagre but tenacious clay, formed by the grinding of these stones (of which felspar forms the chief ingredient) by the continued action of carriage wheels. Thirdly, porcelain clay is of itself scarcely at all fusible, and the addition of 100 or 200 per cent. of fine sand to it would make a perfectly opaque body, incapable of undergoing that state of semifusion by which alone the true porcelainous texture can be produced. Neither could this substance be formed into a glaze by mixture with burnt alum and precipitated alumina, although the addition of these latter ingredients to the powder of compact felspar would form a composition capable of vitrifying at a high heat into a translucent or semiopaque enamel. I am therefore inclined to believe that the petuntse is compact felspar and not sandstone; and that those manufacturers who use calcined flints, or other substances, containing silica almost in a state of purity, as the representative of petuntse, are obliged to add, besides porcelain clay, the other avowed ingredient, some alkaline or vitreous flux, in order to give the ware its due degree of semitransparency. Such addition, however, cannot be made without incurring the hazard of lowering too far the infusibility of the porcelain.

All the Chinese porcelains that I have had an opportunity of examining may be reduced to three kinds, as far as regards the body of the ware. The first is that of which the larger pieces of the old blue and white Nankin are formed. Its texture is in general compact, with more or less tendency to fine granular; the fracture surface is even, with a glistening, somewhat resinous lustre; it is translucent at the edges, and has a very pale ochre yellow colour. In order to conceal the colour, it is covered with a white semiopaque glaze of considerable thickness.

The second differs from the former in having a more compact texture and a white colour. Its glaze is therefore thin and transparent, or nearly so. When the inner surface is left white, as in coffee-cups and other articles of domestic use, no glaze seems to have been applied on that side, it being of itself sufficiently smooth and glossy.

The third kind is lighter than the preceding; it is translucent, has a beautifully even shining surface, but the glaze is so thin as to be scarcely perceptible: it is made only into small articles, and seems to answer well to the hoaché porcelain of D'Entrecolles. All the above varieties are exceedingly infusible, being decidedly superior in this quality to most of the European kinds.

[TO BE CONTINUED.]

Diving Operations at Portsmouth.

To the Editor of the Nautical Magazine.

Portsmouth, 18th August, 1832.

Sir,—You request me to give you a few lines on the subject of the ingenious and enterprising Mr. Deane's submarine operations, and I therefore copy for you a memorandum which I made after seeing that gentleman make an excursion under water, on Friday, the 10th of this month, to the great edification and amusement of the good folks of this busy place.

The essential part of Mr. Deane's machinery consists of a large metal helmet-like covering for his head and neck, which rests upon his shoulders, and is attached by straps to his body.

At the top there enters the end of a long flexible tube, connected with an air pump, through which, by means of a winch, the requisite supply can be forced in, while the air which has been used, finds its way out by a short pipe at the lower part of the helmet. Three windows of strong glass protected by stout cross wires, enable the diver to see the objects round him. Over his legs, arms and body, he draws a water-tight dress of Mackintosh's cloth; but this is merely to prevent the inconvenience of getting wet, and has nothing to do with the diving bell machinery, which consists in the helmet and air-pipe alone. Instead of being lowered down, as in the case of the diving bell, Mr. Deane employs a ladder, one end of which rests on the ground, the other against the side of his vessel, anchored over the object he wishes to examine. It is necessary, however, in order to his easy descent, that he should attach weights to his body, and I think he told me the quantity required was not less than sixty or seventy pounds, besides thick leaden soles to his shoes.

When all is ready, he very deliberately steps on the ladder, and walks off under the surface! The effect on the spectators is extremely curious, as the bold experimenter is gradually lost sight of, and the only indication of his place is a series of bubbles rising over him. On reaching the bottom, he quits the ladder, and roves at pleasure along the ground, sometimes proceeding to a considerable distance from his vessel, the only limit, indeed, appearing to be the length of the air pipe, of which there lies a considerable coil on the deck. I forgot to mention that a small rope is tied round his middle, the end of which is held on board by his son, a fine lad of about twelve years of age, the only person whom his father ever permits to touch this important part of the apparatus. By pulling it once or twice, or jerking it in a particular manner, the diver has acquired the means of communicating his wishes to the people above. Sometimes he wishes them to work the air pump harder; sometimes he requires the ladder to be shifted; sometimes to have a basket sent down; sometimes to have a rope lowered, with a hook fastened to it, that the basket which he has filled with things collected at the bottom may be pulled up:

in short, he appears to possess a power of communicating from the bottom of the sea all he wishes, to those above water.

As yet, Mr. Deane's operations in this quarter have been confined to the wreck of H. M. S. Boyne, which you may remember caught fire at Spithead about thirty-seven years ago, and was stranded near South Sea Castle. The most interesting things he has brought up are some bottles of wine, of which the corks are entire, though slightly softened. The external part of the bottles is covered in some places with very fine shells; but all the protuberent parts of the glass have received a slight rubbing, as if they had been pressed against a turning lathe. On the occasion when I saw Mr. Deane go down, he remained seventeen minutes, and brought up a broken bottle, sundry fragments of bolts, a portion of a sword blade, a boat hook, and the bone of a man's leg, probably one of those infatuated wretches, who, at the very instant the fire had reached the door of the magazine, and it was known the ship must soon blow up, busied themselves in stripping off the copper sheathing!

Mr. Deane next proceeds, I understand, to the wreck of the Royal George, where his researches cannot fail to be very interesting. And here I cannot help observing, that it surely is a national disgrace to us that we have permitted that ship to lie at the bottom for so long a period, to the destruction of the very finest part of the noble anchorage of Spithead. Surely government ought long ago to have ordered her to be removed, either whole or in pieces. Not to speak of the Rennies and Telfords of the civil engineers' society, there is not a dock yard in the country that might not have provided men who, in a few weeks or months, would have removed every particle of this devoted ship, and cleared the roadstead of this very serious obstruction.

I am your obedient servant,

B. H.

[*Nautical Magazine.*

Observations on a new Metallic Sheathing for Ships' Bottoms, by Mr. Abraham Booth, Practical Chemist, Lecturer on Chemistry, &c.

Of all the various topics of useful and practical inquiry, which come within the range of scientific investigation, there are, perhaps, few more intimately connected with the commercial spirit of enterprise of this country, than those which relate to naval architecture. The attention of the government, and the private exertions of individual enterprise, have very laudably been directed towards this subject during the last few years, and the eagerness with which the public bestow their patronage and attention upon any attempts at improvement, whilst it may be considered an earnest of the importance of the subject, is also a proof that it amply deserves the attention, and requires the judgment of a discriminating scientific press.

Amongst other individual branches of inquiry, the sheathing for ships' bottoms has occupied no inconsiderable share of attention. To devise some means whereby the timber might be preserved from injury, from general or accidental circumstances, but more particularly from those of marine worms, and other productions, was the first object of attention in the infancy of naval architecture, and this was first effected by the hides of animals, covered with pitch, or asphaltum; but the successive developments introduced by the progress of naval and commercial intercourse, soon brought into requisition the use of metallic sheathing, as being the most durable, and the most eligible and practicable in effect.

Although the use of leaden sheathing was first adopted in the English marine, copper has more latterly been exclusively applied for this purpose. The expense, however, attendant upon the use of this metal, in consequence of its rapid degree of corrosion and decay, when in contact with salt water, has always been found a most serious objection to its use; and to remedy which, various suggestions and numerous experiments have been made, but without success. The corrosion of the metal is found materially to vary in different anchorages, dependant upon local circumstances, or upon the quantity of decaying organic matters contained in the water, and which greatly facilitates the oxidation and solution. At Sheerness the rapidity of decay is very great, in consequence of the copper being subjected to the alternate action of the sea, which flows in there from the Bristol channel, and to the flux of water down the Thames and Medway, loaded, as they undoubtedly are, with the products of animal and vegetable decomposition. A very general belief formerly prevailed, that sea water had very little or no action on pure copper, and that the rapid decay of that metal on certain ships was owing to its impurity; but the converse has been proved to be the fact, as the attempts to purify the metal, which have proved successful since the government have manufactured its own copper sheathing, has unquestionably been the cause of its more rapid decay. Alloys of copper have generally been proved the most durable; and various patents have at different times been taken out for the fabrication of such compounds; but metallic sheets so formed, have uniformly been found too hard and brittle for practical use, and not to admit of that flexibility which is so necessary for their application to a curved surface, and the consequence of which has been, that they have uniformly cracked upon a ship's bottom.

The remedy that presented itself to Sir Humphrey Davy, was, that the corrosion of the copper sheathing might be prevented by rendering the copper electro-positive, by means of the contact of tin, zinc, lead, iron, or some other easily oxidable metal. This was what the superiority of the use of impure copper, or copper alloys would seem to indicate.

Sir Humphrey Davy undoubtedly deserves credit for the zeal and talent with which he prosecuted his investigations; and, although the truth of his remedy was only established by the failure of his experimental trials, yet it pointed out the correctness and value of that

train of investigation, by which alone we can hope to obviate a defect so very serious in naval economy.

I have prefaced these observations as an introduction to a new metallic sheathing, proposed for ships' bottoms, and for other purposes for which iron, tin, and lead are applied; and where these easily oxidable metals are exposed to the action of water or the atmosphere, as in verandas, or on roofs; because it points out the advantages and applications to which our knowledge of the electric states of metals, and metallic combinations, may be extended, and in many cases with peculiar advantage and interest.

My own experiments upon this combination, enable me satisfactorily to recommend it to your notice, as likewise to those of your readers who are engaged in objects of naval intercourse, as it is evidently not acted upon by any of those agents, or in any of those circumstances to which it is exposed from its employment or application. It is the invention of the manufacturer, Baron Wettersdett, a gentleman who can claim the honour of being fellow pupil and associate in chemical studies, with his illustrious countryman Berzelius; and it may, therefore, with justice, be presumed that it is the result of some degree of scientific industry and investigation. It is likewise some satisfaction to observe, that this celebrated philosopher has expressed a favourable opinion respecting the merits of this invention in a letter to the manufacturer.

The marine sheathing I have verified on analysis to be an alloy of lead, antimony, and quicksilver, and the combination of these metals is such as not only to preserve them from oxidating, but also to impart to the composition peculiar qualities of cohesion, tenacity, and elasticity, not possessed by copper, or its alloys in general, and which render it highly eligible for the purpose to which it is applied. The cohesion of the particles is not destroyed by a violent strain or blow, as in copper, but being highly elastic and tenacious, the metal adapts itself to the force of the percussion. Its tenacity gives it a ready adaptation to curved surfaces; which is of very considerable value, not only in first covering the vessel, but has also proved to be very effectual in obviating the effects of any accidental strain which the vessel may receive during her passage, and which under ordinary circumstances might prove instrumental to the loss of the ship and cargo, and would, I doubt not, be found equally so in case of its being driven on the surfaces of rocks or sands. Although the outward surface of the sheathing remains perfectly clean and bright, like silver, there is, under no circumstances, any adhesion of barnacles, or marine productions, which were found so great a source of obstruction in the experimental trials with the Protector, notwithstanding the *a priori* conclusions of Sir Humphrey Davy, that a negative state of electricity would be unfavourable to vegetable life or production. It may likewise be observed, that the combination acquires additional hardness by being in continual contact with sea water; that the price for sheathing a vessel is considerably less than that of copper, and that this is far more durable.

In this, as in similar cases, practical men are best gratified with

practical proofs, and as no train of investigation or philosophical reasoning can be considered perfect unless supported by such testimony, this being now a matter of extensive practice and experience, I have appended the following testimonials, copies of which I received on a late visit to the manufactory, and which, I have no doubt, will satisfy the readers of the Mechanics' Magazine of the merits of this new invention.

Plymouth, August 2, 1832.

"The barque, Royal William, Capt. Thomas Peake, having been lain on the ground in Stonehouse Pool, we, the undersigned, have this day attended alongside and under the bottom of the said ship, for the purpose of examining the state of the patent marine metal sheathing which was put on the Royal William at this port in March last, since which the ship has performed a voyage to Prince Edward Island, and back; and we declare, after a minute inspection, we find no more the appearance of corrosion than would have appeared on the best copper sheathing for the same time. It is quite bright, free from grass, barnacles, or shells; and, although a few sheets were gone, down the bows, it is our belief that this arose from want of sufficient nails, as the ship struck the ice on her passage out. We have no doubt whatever, that the patent marine metal will answer well for sheathing ships.

(Signed.)
W. Cumming, Surveyor of Shipping, and Sub-Commissioner of Pilotage.
T. Peake, Capt. Royal William.
G. Peake, Owner of the Ship.
C. Cumming, Ship-owner.

Portsmouth, August 8, 1832.

The Reward, of this port, having grounded on the coast of Cornwall, near Penzance, and during which time a very heavy surf was running on the shore, that filled the boat alongside, and shook the schooner to a great degree, I declare it to be my belief, that the patent marine metal, from its elasticity, and the tarred paper betwee it and the vessel's bottom, was the cause of my saving the said schooner, and getting her to the port of Plymouth. The keel of the keelson and some timbers being broken, and the vessel so much strained that she appeared to be kept afloat wholly by the patent sheathing and paper.

(Signed,)
Nicholas Goss, Commander of the Reward.

Newcastle, June 23, 1832.

I am happy to say the Relief has arrived at Sunderland in the best

possible condition. A portion of the new sheathing has been taken off her, and appears quite unaffected by exposure, whilst the copper, placed to secure the edges of the marine metal, was completely corroded and destroyed. The vessel sails again to-morrow for Archangel. I understand that a sheet has been taken off her to send for exhibition to the Baron, which, I doubt not, will be attended with particulars. The piece sent to me is not more affected than that which you showed me at Limehouse. The owner of the Relief intends having another vessel of his sheathed in a similar way; and I shall be glad to learn that the application of this new sheathing for ships' bottoms increases with experience, and that the inventors may be amply remunerated.

(Signed.) T. Crawhalle.

[*Mech. Mag.*

¶ *Account of the arrival of the "Comet" Fire Engine, at Berlin, and of the experiments there made with it.*

From the Allgemeine Preusische Staats-Zeitung, for December 2, 1832.

To the many useful applications of steam power which have been witnessed of late years, we have now to add that of working fire engines by steam. The merit of having first manufactured such an engine is due to Messrs. Braithwaite & Co. of London. This machine, which consists of a six horse power steam engine, and the pumps worked thereby, rests upon a carriage, which can be easily drawn by two horses, and, in consequence of the peculiar construction of the steam boiler, can be brought into action in the course of thirteen minutes. Its effects are extraordinary; and its utility has been already exemplified at several large fires in London, among which may be mentioned the Argyll rooms in Regent street—English opera house, Strand—and, lastly, the celebrated brewery, of Messrs. Barclay, Perkins & Co. On the last occasion the engine particularly distinguished itself; and after the fire, and the total loss of the steam engine and pumping apparatus, it was of extraordinary service to the proprietors of the brewery, in pumping, for twenty-five days, the beer brewed in the part of the building that was saved, to the vats, fifty feet above the level of the street.

As the double acting pump of the engine, which is worked by a six horse steam engine, is six and a half inches diameter, and makes thirty 14 inches double strokes per minute, it can pump in a day of ten hours, 8,640 cubic feet, and in twenty-five days, 216,000 cubic feet, English measure, to the height of fifty feet.

The Prussian Ministry of the Interior, for trade, traffic, and building, has had a similar engine, but of still greater power, made by Messrs. Braithwaite & Co. It works by an engine of fifteen horse power, and is the first of its size made at their manufactory. The

makers have named it the Comet. There were several trials made of it to-day, on the building ground of the court-marshall office, in University street, which proved equally satisfactory with those made for two whole days at London. The engine consists of two horizontal ten-inch double-acting pumps, which are worked by two small steam engines of the united power of fifteen horses. The pumps, engines, and boiler, with connectors, rest on four of Jones' (of London) patent wheels, (cast iron boxes, with wrought iron spokes and rims,) and can, notwithstanding the immense weight of four tons, (when the boiler is charged,) be easily drawn by four horses on a paved road. Those patent wheels are on the same principle as those with which the Artillery Company at Woolwich have made, according to the United Service Journal, such satisfactory experiments. In the course of twenty minutes from lighting the fire in the boiler, the engine was started, and made then twenty to twenty-five strokes per minute. The pumps being ten inches diameter, they will draw, with twenty-five 14 inch strokes, fifty-seven cubic feet per minute, or 3,103 cubic feet per hour, and throw it through the hose to great heights and distances. To the air-chamber there may be fixed four sets of hose, which can be used together or separately. By using one hose, and a jet of one and a fourth inches in diameter, the water was thrown vertically to the surprising height of 120 feet; and at an angle of forty-five to fifty degrees, to a distance of 164 feet. The effects of this engine are accordingly very great, and can even be increased by giving it a quicker stroke. The engine is destined, in particular, for the protection of the Royal Palace, the Cathedral, Museum, new Sufferance warehouses, and court house, the Governor's Palace, his Majesty's Palace, that of her Grace the princess of Lignitz, the Life-Guard House, the Finance Ministry Office, the Academy of Music, the University, the palaces of the Queen of the Netherlands and of his Royal Highness Prince William, the Library, the office of the Minister of the Interior for Trade, &c., the Opera House, and the Royal Buildings in Burg street.

For the supply of the great quantity of water necessary for the engine, cast iron suction pipes are to be laid under the pavement, with plugs to which the suction of the engine may be fixed. In consequence of this arrangement the engine may be used as well for extinguishing fire itself as for supplying other engines with water. As there are 400 feet of hose belonging to it, the water may even by that means be conveyed to great distances; and a large plain may be protected by placing the engine in a circle, the radius of which is 400 feet.

Finally, it is scarcely necessary to observe how advantageous the application of steam is for working fire engines, whether they be on barges or carriages; in the first case without exception—in the latter where there is no want of water. The time of thirteen or twenty minutes, which the generating of steam requires, with small or larger engines, is no drawback to their utility, as the steam is generated whilst the horses are being put in, and the engine driven to the fire, and while the suction is being connected to the water pipes by engines

on carriages. The engine requires an engineer, a stoker, and from one to four men to attend to the hose. It saves the strength of from forty-two to 105 men, according to its size, from six to fifteen horse power; it does not tire, works regularly, and requires no relief. The diminution of a crowd, which is so disagreeable at a fire, and of the space necessary for many small engines—the greater distance from the fire in which this engine may be placed, and the simplification of directing firemens' exertions, are certainly undeniable advantages. If, therefore, even the application of steam fire engines by land may be with us but small, as sufficient water can only be produced near rivers or canals (there being no water-works,) the utility of these engines must call for their general adoption in barges, where there is no such impediment. [*Ibid.*

Advantages of Rail-Roads.

The following statement from the Mechanics' Magazine, of the advantages the public are likely to derive from rail-roads, is clearly displayed in the increasing prosperity of the Liverpool and Manchester rail-way. Before its establishment there were twenty-two regular, and about seven occasional extra coaches, between those places, which, in full, could only carry 688 persons per day. The rail-way from its commencement carried 700,000 persons in eighteen months, being an average of 1070 per day. There has occurred but one fatal accident on it in eighteen months. The fare by coach was 10s. inside and 5s. outside—by rail-way it is 5s. inside, and 3s. 6d. outside. The time occupied in making the journey by coach was four hours—by rail-way it is one and three-fourths hour. All the coaches but one have ceased running, and that chiefly for conveyance of parcels. The mails all travel by the rail-way, at a saving to government of two-thirds of the expense. The rail-way coaches are more commodious than others. The travelling is cheaper, safer, and easier. A great deal of traffic which used to go by other roads, comes now by rail-way; both time and money are saved, though the length of the journey may be often increased. The proportion of passengers carried by rail-way over those carried by coach, has been as twenty-two to ten, in winter, and seventeen or eighteen to ten, in summer. A regiment of soldiers has been carried by the rail-way from Manchester to Liverpool in two hours. Gentlemen's carriages are conveyed on trucks by the rail-way. The locomotives travel in safety after dark. The rate of carriage of goods is 10s. per ton; by canal it used to be 15s. per ton. The time occupied in the journey, by rail-way is two hours; by canal it is twenty hours. The canals have reduced their rates thirty per cent. Goods are delivered in Manchester the same day they are received in Liverpool. By canal they are never delivered before the third day. By rail-way, goods, such as wines and spirits, are not subject to the pilferage which existed on the canals. The

saving to the manufacturers in the neighbourhood of Manchester, in the carriage of cotton alone, has been £20,000 per annum. Some houses of business save £500 a year in carriage. Persons now go from Manchester to Liverpool and back in the same day with great ease. Formerly they were generally obliged to be absent the greater part of two days. More persons now travel on their own business. The rail-way is assessed to the parochial rates in all the parishes through which it passes; though only thirty-one miles, it pays between £3000 and £4000 per annum in parochial rates. Coal pits have been sunk, and manufactories established on the line, giving great employment to the poor; manufactories are also erected on the line, giving increased employment, and thus reducing the number of claimants for parochial relief. The rail-way pays one-fifth of the poor rates in the parishes through which it passes; fresh coal mines sunk, owing to facilities of carriage, and price reduced. It is found advantageous for the carriage of milk and garden produce; arrangements are about to be made for milk to be carried fifteen miles at one shilling for ten gallons, (i. e. less than one farthing per quart.) A great deal of land on the line has been let for garden ground, at increased rents.

Residents on the line find the rail-way a great convenience, by enabling them to attend to their business in Manchester and Liverpool with ease, at little expense. No inconvenience is felt by residents from smoke or noise; and, on the contrary, great advantage is experienced by means of travelling, to and fro, distances of ten miles in half an hour, for one shilling, and without any fatigue. The engines only burn coke. The value of the land on the line has been considerably enhanced by the operation of the rail-way; land cannot be purchased but at a large increase in price. It is much sought after for building, &c. The Rail-way Company, in their late purchases, have been obliged to pay, frequently, double the price they originally paid for their land. A great deal of land has been sold for building at three times its former value. Much waste land on the line has been taken into cultivation, and yields a good rent. Land owners originally opposed to the rail-way are now its warm advocates, having found their fears groundless; they have now been solicitous that the line should pass through their land.

Mr. Babbage observes, in his book on the Economy of Manufactures, "One point of view in which rapid modes of conveyance increases the power of a country, deserves attention. On the Manchester rail-road for example, above half a million of persons travel annually; and supposing each person to save only one hour in the time of transit between Manchester and Liverpool, a saving of five hundred thousand hours, or of fifty thousand working days, of ten hours each, is effected. Now this is equivalent to an addition to the actual power of the country of one hundred and sixty-seven men, without increasing the quantity of food consumed; and it should also be remarked that the time of the class of men thus supplied is far more valuable than that of mere labourers."

[*Rep. Pat. Inv.*

Brown's Gas Vacuum Engine.

Mr. Brown, the inventor of the gas vacuum engine, has recently exhibited on his premises, at Old Brompton, three of his gas engines, of different construction and power, with the latest improvements, in full operation. The principle, or rather the application of the principle, by which this new power is generated, namely, the creation of a vacuum by the ignition of gas in a cylinder, was discovered by Mr. Brown about seven or eight years ago, and he has been since indefatigably employed in bringing his invention to perfection. An engine, on this principle, has been at work for the last eighteen months on the Croydon canal, raising water from the lower to the upper lever, and has, it appears, fully answered its design. This engine which, of course, resembles in many of its details, a steam engine, is, however, simple in its construction. It consists of a wrought iron cylinder, standing in the lower level of the canal. To set it at work, water is turned by a cock upon a wheel, (regulating the motion and number of strokes per minute,) which opens a valve, and admits a certain quantity of gas, from a pipe connected with a gasometer, into the cylinder, which gas is immediately inflamed by a jet of lighted gas, and expels the air from the cylinder by raising the lid, which instantly closes again. A perforated tube, inside the cylinder, fed with water from a pipe outside, gives out the water, cools the cylinder, completes the vacuum, and raises the water in the cylinder to a given height. An atmospheric valve is then opened and the water rushes out of the discharged valve; this is the result of one stroke. The Croydon engine is twenty-two feet high, and two feet six inches diameter. An engine, upon the same construction, at Eagle Lodge, is four feet eighty-seven inches diameter, and its power is surprising. The number of strokes it gives per minute is between five and six; and each stroke raises, with tremendous impetus, seven hundred and fifty gallons of water, filling a cistern of the capacity of five and twenty pipes of wine, in about three-quarters of a minute! The expense, or rather the profit, of working these engines, is an important property of the invention. By the accurate calculation of an eminent engineer, it appears that the quantity of small coal consumed last year for the Croydon engine, was 417 chaldrons, which produced 592 chaldrons of coke, and 4800 gallons of tar. The cost of the coal was 458*l.* 14*s.*, to which must be added, for attendance on the engine, repairs, an allowance of per cent. on the value of the building, and ground rent, 208*l.*—making in all 666*l.* 14*s.* The value of the coke and tar was 769*l.* 12*s.* Thus it appears that this engine constitutes a mechanical power, in effective and constant action, retaining a clear profit of 102*l.* 18*s.* per annum, exclusive of what the work may be worth which that power effects. An experiment recently made gave fourteen bushels of common coal, twenty-one bushels of coke, of two qualities, besides the tar, and 1200 feet of gas.

The superiority of these engines over those moved by steam, con-

sists in the simplicity of their construction, the economy of working, the absence of danger, (for there is nothing in them which can occasion explosion,) and the advantage of their being always ready for action. These recommendations particularly adapt them for raising water, drainage, mill machinery, &c. There is one object which they will accomplish to which the steam is not applicable: in large buildings, or public works, they may be applied to fire engines of any power, which may be put into instantaneous action by gas supplied from the mains in the streets, and any quantity of water may thus be thrown to any height at a moment's notice. [*Ibid.*

Improvement in the quality of Iron and Steel, from their becoming rusty when buried in the earth.

The following "extract from Chronicles of Old London Bridge," is sufficiently curious in itself to merit insertion in the Philosophical Magazine and Journal of Science, and as an instance of observation ingeniously applied.

An eminent London cutler, Mr. Weiss, of the Strand, to whose inventions modern surgery is under considerable obligations, has remarked, that steel seemed to be much improved when it had become rusty in the earth, and provided the rust was not facitiously produced by the application of acids.* He accordingly buried some razor blades for nearly three years, and the result fully corresponded to his expectations; the blades were coated with rust, which had the appearance of having exuded from within, but were not eroded, and the quality of the steel was decidedly improved. Analogy led to the conclusion, that the same might hold good with respect to iron under similar circumstances; so with perfect confidence in the justness of his views, he purchased, as soon as an opportunity offered, all the iron, amounting to fifteen tons, with which the piles of London Bridge had been shod. Each shoe consisted of a small inverted pyramid, with four straps rising from the four sides of its base, which embraced and were nailed to the pile; the total length from the point which entered the ground to the end of the strap being about sixteen inches, and the weight about eight pounds.

The pyramidal extremities of the shoes were found to be not much corroded, nor indeed were the straps; but the latter had become extremely and beautifully sonorous, closely resembling in tone the bars and sounding pieces of an Oriental instrument which was exhibited some time since with the Burmese state carriage. When manufac-

* This enterprising artist has informed me, that "some years since, he sent with Capt. Parry, in his voyage to the North Pole, some steel, which was constantly exposed on deck in the northern latitudes without being in the slightest degree rusted, but on arriving in a warmer and moister atmosphere, it became so. This steel he found very good, but not equal to that from London Bridge."

tured, the solid points in question were convertible only into very inferior steel: the same held good with respect to such bolts and other parts of the iron work as were subjected to the experiment, except the straps; these, which in addition to their sonorousness, possessed a degree of toughness quite unapproached by common iron, and which were, in fact, imperfect carburets, produced steel of a quality infinitely superior to any which in the course of his business Mr. Weiss had ever before met with; insomuch that while it was in general request among the workmen for tools, they demanded higher wages for working it. These straps, weighing altogether about eight tons, were consequently separated from the solid points, and these last sold as old iron.* The exterior difference between the parts of the same shoe led at first to the supposition that they were composed of two sorts of iron; but, besides the utter improbability of this, the contrary was proved by an examination, which led to the inference that the extremities of the piles having been charred, the straps of iron closely wedged between them, and the stratum in which they were imbedded must have been subjected to a galvanic action, which in the course of some six or seven hundred years gradually produced the effects recorded in the present paper.

T. J. H.

[*Philosophical Magazine.*

¶ *Hancock's Steam Coach at Brighton.*

To the Editor of the Mechanics' Magazine.

Sir,—Having received an intimation that Mr. Walter Hancock's steam carriage, the "Infant," was on the road to this place on an experimental trip, I went to meet it at eight miles on the London road yesterday morning, and come with it from thence into Brighton. We travelled at the rate of between five and six miles per hour up the steep hill at Pie-Comb, and descended at the rapid rate of full thirteen miles per hour, proceeding afterwards steadily into the town, at ten miles per hour. Mr. Hancock made a detour round the North Steyne enclosure, up to the palace gate, and returned to the Tank near the new church, where he stopped half an hour to take in coke and water, and proceeded immediately on his return to London.

This unexpected visit excited very great interest along the road and in the town, and caused an instantaneous assemblage of the entire neighbourhood, who greeted Mr. Hancock with three hearty cheers. I understand from some of the gentlemen who accompanied

* A successful application of genius or observation is rarely heard of without some one endeavouring to reap the benefit, or the credit, of the discovery, while entitled to neither, nor perhaps understanding the principle on which it depends. The fame of Mr. Weiss' steel soon spread, when another person immediately purchased the bolts and fastenings of the old bridge: the articles manufactured from them will answer equally well as *relics*.

Mr. Hancock from London, that the only inconvenience experienced on the road arose from want of proper relays of coke and water, and that they travelled at the rate of from nine to eleven miles per hour on the more level parts of the road, and from five to seven up the hills. The coke for the first part of the journey was procured in London, and for the latter part from Brighton. A fact worth notice was elicited from this circumstance; namely, that it was much more difficult to keep up the fire with the Brighton coke, and that a much greater quantity of it was consumed than of the London coke, in proceeding equal distances—a circumstance I have found on inquiry to be satisfactorily accounted for by the use of *clay* retorts at our gas works, which enable the proprietors to extract 12,000 feet of gas from a chaldron of coals, while the iron retorts used in London limit the operation to 10,000 feet. Thus the London coke is obviously less exhausted of its carbon than that which is sold at the Brighton gas works.

This experiment is considered here as a very satisfactory proof of the practicability of travelling by steam on common roads. There are several long and steep acclivities between London and Brighton, particularly Red-hill, Hand-cross-hill, and Pie-comb-hill; all of which were gallantly ascended, and the roads were generally wet and heavy.

Mr. Hancock's visit has become a subject of general conversation, and a hope is universally expressed, of soon seeing him again in our town, with his new steam-carriage, the "Æra."

Yours, &c.

C. A. Busby.

Stanhope-place, Brunswick-terrace, Brighton, Nov. 3, 1832.

¶ *Accident from Hancock's Steam Carriage.*

On Saturday last, the 22nd inst., an inquest was held by the Coroner of Essex, at the Harrow inn, Stratford, on the body of Richard Outridge, an engineer in the employment of Mr. W. Hancock, of Stratford, who met his death on Thursday under the following circumstances:—George Bish, foreman to Mr. Hancock, deposed, that the deceased, who had been some months in the employ of Mr. Hancock, was, with other workmen, putting the machinery of a new steam coach in action on the premises in order to try its performances. The witness described the peculiar construction of Mr. Hancock's chamber boilers, and deposed that there were two safety valves on the boilers in question, one of which he had himself weighted to the pressure of one hundred pounds upon the square inch, the deceased undertaking to adjust the one on the other side of the boiler to the same pressure. The witness then left the carriage for a short time, and on his return discovered that the steam was blowing off very powerfully from the valve which he (the witness) had adjusted, and that the sides of the boiler were rapidly distending. Witness called

to the deceased (who was standing in the engine room of the coach, with his back to the boiler, examining the working of the engines,) to throw off the blower, by which means the fire would have nearly ceased its action, but that the deceased replied he had forgotten to fix the lever on; the deceased then stopped the engines; the witness cast his eyes to the valve which had been left to the care of the deceased, when he saw it fastened down by a strong copper wire; he called to the deceased to relieve it, but before he could effect this, (through the wire being twisted several times round an iron punch which the deceased had strongly driven into the wood framing of the engine room, in the absence of witness,) one of the eleven chambers composing the boiler was rent, and the great force of the accumulated steam threw the deceased back against the engines. The deceased was removed into the house, and medical assistance immediately obtained, but he expired in about an hour. The witness, in answer to questions from the jury, said that had it been a boiler as constructed by others, years ago, much injury must have ensued from the fragments of metal which would have been driven in every direction, with great violence, amongst the men who were at the time around the coach.

Other witnesses were examined, and on its being ascertained to the satisfaction of the coroner and jury that the fastening down of the valve was the act of the deceased, the coroner observed that had the deceased survived, and any other person met his death, in that case the deceased would have taken his trial for manslaughter, from his culpable negligence in the management of a thing which he, by his occupation, so well understood, it being proved that he had been for a length of time engaged in similar work, and was well aware of the nature and operations of steam.

The jury having minutely examined the boiler and engines of the coach in question, as also of another coach upon the same construction, and which was put at work for the purpose, and all its parts being explained to them, brought in the following verdict—"Accidental death, *caused by the deceased's own negligence.*" The jury added, that they were quite of opinion that Mr. Hancock's boiler, from its peculiar construction, was as free from danger as any boiler could be; in which opinion they were borne out on their examination of the body of the deceased, which was not at all mutilated; neither was the machinery nor the body of the coach injured. The deceased, who bore the character of a steady workman, was twenty-eight years of age, and has left a widow and three children to deplore his loss.

[*Mech. Mag.*

Kyan's Remedy for the Dry Rot.

Mr. Kyan's process is simply this:—He immerses the wood in a solution of corrosive sublimate, (one pound of the sublimate to five gallons of water,) till it is thoroughly saturated.

In compliance with an order of the Navy Board, Mr. Kyan prepared nine pieces of oak, sent him from Woolwich yard, where nine duplicate pieces were retained, all being marked by the proper officer. Of these specimens, five pieces, with their duplicates, were on the 9th and 10th of August, 1831, inserted in timber totally decayed with dry rot, in the Thalia frigate, stationed in the river at Woolwich; one other piece and its duplicate in the decayed timber of the dry-dock; and the three remaining pieces and their duplicates in the before named pit at Woolwich yard. In February, 1832, Mr. K. had the whole of the nine pieces and their duplicates inspected, when the entire of those prepared by him were found in the most perfect state of preservation, without spot or blemish, while all the unprepared duplicates had taken the infection, being covered with fungus mould. Mr. Kyan, therefore, on the 29th of February last, addressed the Lords of the Admiralty, requesting an inspection and report thereon by the proper officer, to which he received a reply, stating that the matter would receive further attention and consideration by government, and the result of these reports, when received, be communicated to him in due course. In the meanwhile, "by the advice, and under the kind recommendation of some of the Lords of the Admiralty," he took out a patent, 31st March, 1832, for his invention, and their Lordships have been pleased to say they will purchase of him the privilege of its use for his Majesty's yards, leaving him at liberty to sell to other governments, and to the public generally."

Mr. K. states that the invention is equally useful as a preserver of canvass and cordage, and that he has several pieces of canvass prepared by him with his solution, which have been submitted to the strongest test; having been for six months in damp, in a foul cellar, but are in nowise deteriorated, whilst the duplicate pieces in their natural state are totally covered with mildew, and are, for the most part, rotten.

Mr. K. states it to be "a well known fact, that no piece of timber was ever found to sustain itself in soundness half so long as Mr. Kyan's has done in the pit at Woolwich;" and that it "usually gives way in about six to nine months." Of the nine prepared pieces and duplicates, four were of seasoned, and two of unseasoned, or fresh, English oak, and three of American oak.

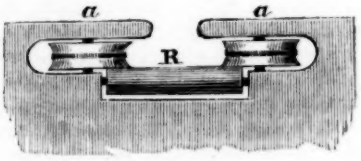
The time required for saturating any description of timber is about fourteen days, and it is fully seasoned within two months from that period. The process imparts no colour whatever. [*Ibid.*

Improved Leading Blocks.

Sir,—On examining some "leading blocks," as they are technically called, a short time since, I was struck with the appearances which many of them presented. In some, the pulley had set fast, and one side had been cut into by the rope, while in all, the way between

the pulley was cut into deep grooves; evidently showing the existence of great mechanical disadvantage, where the reverse would have been highly desirable.

It occurred to me at the time, that a little addition would make a great improvement in this useful machine, and I send a sketch of a method of construction that would be found very much superior to those at present employed.



The annexed sketch represents the side of a ship, or dock, &c. &c. *a a* are two gun metal sheaves, turning on iron axes, and having more end play than is usual. The sheaves rest upon a metal roller, R, which runs freely upon an iron axis.

The roller should be closed in, about half way up, both on the outside and within.* The framing of the block should be lined with iron, and the whole kept well greased, to reduce the friction and prevent corrosion. With this form of block, the friction, and, consequently, the labour, as well as the wear and tear of ropes, would be greatly reduced.

For, if the rope happened not to run against either of the sheaves, it would still work upon the roller, where motion would be almost as free. If the rope took into a sheave, that and the roller would turn together; the other sheave would be at liberty to turn with the roller, the friction between them most likely being sufficient to communicate motion.

The increased efficiency and durability of these blocks, would amply repay the additional expenses of construction.

Yours, respectfully,

W. Baddeley.

London, Sept. 27, 1832. [*Mech. Mag.*

Consumption of Silk.

The quantity of this material used in England alone amounts each year to more than four millions of pounds weight, for the production of which myriads upon myriads of insects are required. Fourteen thousand millions of animated creatures annually live and die to supply this corner of the world with an article of luxury! If astonish-

* Omitted in the sketch for the sake of distinctness, nor is it absolutely necessary.

ment be excited at this fact, let us extend our view into China, and survey the dense population of its widely-spread region, whose inhabitants, from the emperor on his throne to the peasant in the lowly hut, are indebted for their clothing to the labours of the silk-worm. The imagination, fatigued with the flight, is lost and bewildered in contemplating the countless numbers which every successive year spin their slender threads for the service of man.

[*Rep. Pat. Inv.*

Domestic Yeast.

Persons who are in the habit of making domestic bread, cake, &c. can easily manufacture their own yeast by attending to the following directions:—Boil one pound of good flour, a quarter of a pound of brown sugar, and a little salt, in two gallons of water for one hour. When milk warm, bottle it, and cork it close, and it will be fit for use in twenty-four hours. One pint of the yeast will make eighteen pounds of bread. [*Ibid.*

Caoutchouc.

Few persons are, perhaps, aware of the comparatively late introduction of Indian rubber into this country. The following notice is appended by Dr. Priestly to the preface to his "*Familiar Introduction to the Theory and Practice of Perspective*," printed in 1770; and it will be observed that no name is given to the substance described: "Since this work was printed off, I have seen a substance excellently adapted to the purpose of wiping from paper the marks of a black-lead pencil. It must, therefore, be of singular use to those who practice drawing. It is sold by Mr. Nairne, Mathematical instrument maker, opposite the Royal Exchange. He sells a cubical piece, of about half an inch, for three shillings, and he says it will last several years." [*Philos. Mag.*

Hot Air Blast.

It appears from a paper by Mr. T. B. Neilson, lately read at the Institution of Civil Engineers, that the weekly consumption of coals at the Clyde Iron Works has been reduced by the adoption of the heated blast, from eighteen hundred, to six hundred tons; while at the same time, a greater quantity of iron has been manufactured.

[*Mech. Mag.*

¶ Popular Science.

No. III.

Selections from Letters on Natural Magic.

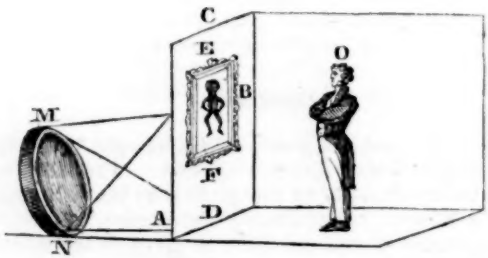
By Sir David Brewster.

(Continued from p. 215.)

Deceptions with the Concave Mirror.

The concave mirror is the staple instrument of the magician's cabinet, and must always perform a principal part in all optical combinations. In order to be quite perfect, every concave mirror should have its surface elliptical, so that if any object is placed in one focus of the ellipse, an inverted image of it will be formed in the other focus. This image, to a spectator rightly placed, appears suspended in the air, so that if the mirror and the object are hid from his view, the effect must appear to him almost supernatural.

Fig. 4.



The method of exhibiting the effect of concave mirrors most advantageously is shown in fig. 4, where CD is the partition of a room having in it a square opening EF, the centre of which is about five feet above the floor. This opening might be surrounded with a picture frame, and a painting which exactly filled it might be so connected with a pulley that it might be either slipped aside, or raised so as to leave the frame empty. A large concave mirror MN is then placed in another apartment, so that when any object is placed at A, a distinct image of it may be formed in the centre of the opening EF. Let us suppose this object to be a plaster cast of any object made as white as possible, and placed in an *inverted* position at A. A strong light should then be thrown upon it by a powerful lamp, the rays of which are prevented from reaching the opening EF. When this is done, a spectator placed at O will see an erect image of the statue at B, the centre of the opening—standing in the air, and differing from the real statue only in being a little larger, while the apparition will be wholly invisible to other spectators placed at a little distance on each side of him.

If the opening EF is filled with smoke rising either from a chafing-dish, in which incense is burnt, or made to issue in clouds from some opening below, the image will appear in the middle of the smoke depicted upon it as upon a ground, and capable of being seen by those spectators who could not see the image in the air. The rays of light, in place of proceeding without obstruction to an eye at O, are reflected, as it were, from those minute particles of which the smoke is composed, in the same manner as a beam of light is rendered more visible by passing through an apartment filled with dust or smoke.

It has long been a favourite experiment to place at A a white and strongly illuminated human skull, and to exhibit an image of it amid the smoke of a chafingdish at B; but a more terrific effect would be produced if a small skeleton, suspended by invisible wires, were placed as an object at A. Its image suspended in the air at B, or painted upon smoke, could not fail to astonish the spectator.

The difficulty of placing a living person in an inverted position, as an object at A, has no doubt prevented the optical conjurer from availing himself of so admirable a resource; but this difficulty may be removed by employing a second concave mirror. This second mirror must be so placed as to reflect towards MN the rays proceeding from an erect living object, and to form an inverted image of this object at A. An erect image of this inverted image will then be formed at B, either suspended in the air or depicted upon a wreath of smoke. This aerial image will exhibit the precise form and colours and movements of the living object, and it will maintain its character as an apparition if any attempt is made by the spectator to grasp its unsubstantial fabric.

A deception of an alarming kind, called the *mysterious dagger*, has been long a favourite exhibition. If a person with a drawn, and highly polished dagger, illuminated by a strong light, stands a little farther from a concave mirror than its principal focus, he will perceive in the air between himself and the mirror, an inverted and diminished image of his own person with the dagger similarly brandished: if he aims the dagger at the centre of the mirror's concavity, the two daggers will meet point to point, and by pushing it still farther from him towards the mirror, the imaginary dagger will strike at his heart. In this case it is necessary that the direction of the real dagger coincides with a diameter of the sphere of which the mirror is a part; but if its direction is on one side of that diameter, the direction of the imaginary dagger will be as far on the other side of the diameter, and the latter will aim a blow at any person who is placed in the proper position for receiving it. If the person who bears the real dagger, is therefore placed behind a screen, or otherwise concealed from the view of the spectator, who is made to approach to the place of the image, the thrust of the polished steel at his breast will not fail to produce a powerful impression. The effect of this experiment would no doubt be increased by covering with black cloth the person who holds the dagger, so that the image of his hand only should be seen, as the inverted picture of him would take away from the reality of the appearance. By using two mirrors, indeed, this defect might be

remedied, and the spectator would witness an exact image of the assassin aiming the dagger at his life.

The common way of making this experiment is to place a basket of fruit above the dagger, so that a distinct aerial image of the fruit is formed in the focus of the mirror. The spectator having been desired to take some fruit from the basket, approaches for that purpose, while a person properly concealed withdraws the real basket of fruit with one hand, and with the other advances the dagger, the image of which, being no longer covered by the fruit, strikes at the body of the astonished spectator.

The powers of the concave mirror have been likewise displayed in exhibiting the apparition of an absent or deceased friend. For this purpose a strongly illuminated bust or picture of the person is placed before the concave mirror, and a distinct image of the picture will be seen either in the air, or among smoke in the manner already described. If the background of the picture is temporarily covered with lampblack, so that there is no light about the picture but what falls upon the figure, the effect will be more complete.

Magic Lanterns.

The power of the magic lantern has been greatly extended by placing it on one side of the transparent screen of taffetas which receives the images, while the spectators are placed on the other side, and by making every part of the glass sliders opaque, excepting the part which forms the figures. Hence all the figures appear luminous on a black ground, and produce a much greater effect with the same degree of illumination. An exhibition depending on these principles was brought out by Mr. Philipstal in 1802, under the name of the *Phantasmagoria*, and when it was shown in London and Edinburgh it produced the most impressive effects upon the spectators. The small theatre of exhibition was lighted only by one hanging lamp, the flame of which was drawn up into an opaque chimney, or shade, when the performance began. In this "darkness visible" the curtain rose, and displayed a cave with skeletons and other terrific figures in relief upon its walls. The flickering light was then drawn up beneath its shroud, and the spectators in total darkness found themselves in the middle of thunder and lightning. A thin transparent screen had, unknown to the spectators, been let down after the disappearance of the light, and upon it the flashes of lightning, and all the subsequent appearances were represented. This screen, being half way between the spectators and the cave which was first shown, and being itself invisible, prevented the observers from having any idea of the real distance of the figures, and gave them the entire character of aerial pictures. The thunder and lightning were followed by the figures of ghosts, skeletons, and known individuals, whose eyes and mouth were made to move by the shifting of combined sliders. After the first figure had been exhibited for a short time, it began to grow less and

less, as if removed to a great distance, and at last vanished in a small cloud of light. Out of this same cloud the germ of another figure began to appear, and gradually grew larger and larger, and approached the spectators till it attained its perfect development. In this manner the head of Doctor Franklin was transformed into a scull; figures which retired with the freshness of life, came back in the form of skeletons, and the retiring skeletons returned in the drapery of flesh and blood.

The exhibition of these transmutations was followed by spectres, skeletons, and terrific figures; which, instead of receding and vanishing as before, suddenly advanced upon the spectators, becoming larger as they approached them, and finally vanished by appearing to sink into the ground. The effect of this part of the exhibition was naturally the most impressive. The spectators were not only surprised but agitated, and many of them were of opinion that they could have touched the figures. M. Robertson at Paris, introduced along with his pictures the direct shadows of living objects, which imitated coarsely the appearance of those objects in a dark night or by moonlight.

All these phenomena were produced by varying the distance of a magic lantern from a screen, which remained fixed, and at the same time keeping the image upon the screen distinct by increasing the distance of the object from the sliders in the tube. When the lantern approached the screen, the circle of light, or the section of the cone of rays from the lens, gradually diminished, and resembled a small bright cloud, when the lens was close to the screen. At this time a new figure was put in, so that when the lantern receded from the screen, the old figure seemed to have been transformed into the new one. Although the figure was always at the same distance from the spectators, yet, owing to its gradual diminution in size, it necessarily appeared to be retiring to a distance. When the magic lantern was withdrawn from the screen, and the object lens at the same time brought nearer to the slide, the image on the screen gradually increased in size, and therefore seemed in the same proportion to be approaching the spectators.

Superior as this exhibition was to any representation that had been previously made by the magic lantern, it still laboured under several imperfections. The figures were badly drawn, and in other respects not well executed, and no attempt whatever was made to remove the optical incongruity of the figures becoming more luminous when they retired from the observer, and more obscure when they approached to him. The variation of the distance of the lens from the sliders was not exactly adapted to the motion of the lantern to and from the screen, so that the outline of the figures was not equally distinct during their variations of magnitude.

Tambouring by Machinery.

The tambouring of muslins, or the art of producing upon them or-

namental flowers and figures, has been long known and practised in Britain, as well as in other countries; but it was not long before the year 1790 that it became an object of general manufacture in the west of Scotland, where it was chiefly carried on. At first it was under the direction of foreigners, but their aid was not long necessary, and it speedily extended to such a degree as to occupy, either wholly or partially, more than 20,000 females. Many of these labourers lived in the neighbourhood of Glasgow, which was the chief seat of the manufacture; but others were scattered through every part of Scotland, and supplied by agents with work and money. In Glasgow, a tambourer of ordinary skill could not earn more than five or six shillings a week by constant application; but to a labouring artisan who had several daughters, even these low wages formed a source of great wealth. At the age of five years, a child capable of handling a needle was devoted to tambouring, even though it could not earn more than a shilling or two in a week; and the consequence of this was that female children were taken from school, and rendered totally unfit for any social or domestic duty. The tambouring population was therefore of the worst kind, and it must have been regarded as a blessing rather than as a calamity when the work which they performed was intrusted to regular machinery.

Mr. John Duncan of Glasgow, the inventor of the tambouring machinery, was one of those unfortunate individuals who benefit their species without benefitting themselves, and who died in the meridian of life the victim of poverty, and of national ingratitude. He conceived the idea of bringing into action a great number of needles at the same time, in order to shorten the process by manual labour, but he at first was perplexed about the diversification of the pattern. This difficulty, however, he soon surmounted by employing two forces at right angles to each other, which gave him a new force in the direction of the diagonal of the parallelogram, whose sides were formed by the original forces. His first machine was very imperfect; but after two years' study he formed a company, at whose expense six improved machines were put in action, and who secured the invention by a patent. At this time the idea of rendering the machine automatic had scarcely occurred to him; but he afterwards succeeded in accomplishing this great object, and the tambouring machines were placed under the surveillance of a steam engine. Another patent was taken for these improvements. The reader who desires to have a minute account of these improvements, and of the various parts of the machinery, will be amply gratified by perusing the inventor's own account of the machinery in the article "Chain-work," in the Edinburgh Encyclopedia. At present it will be sufficient to state, that the muslin to be tamboured was suspended vertically in a frame which was capable of being moved both in a vertical and a horizontal direction. Sixty or more needles lying horizontally occupied a frame in front of the muslin web Each of these working needles, as they are called, was attended by a feeding needle, which, by a circular motion round the working needle, lodged upon the stem of the latter the loop of the thread. The sixty needles then penetrated the web,

and in order that they might return again without injuring the fabric, the barb or eye of the needle, which resembled the barb of a fishing hook, was shut by a slider. The muslin web then took a new position by means of the machinery which gave it its horizontal and vertical motion, so that the sixty needles penetrated it at their next movement at another point of the figure or flower. This operation went on till sixty flowers were completed. The web was then slightly wound up, that the needles might be opposite that part of it on which they were to work another row of flowers.

The flowers were generally at an inch distance, and the rows were placed so that the flowers formed what are called diamonds. There were seventy-two rows of flowers in a yard, so that in every square yard there were nearly 4000 flowers, and in every piece of ten yards long 40,000. The number of loops or stitches in a flower varied with the pattern, but on an average there were about thirty. Hence the number of stitches in a yard were 120,000, and the number in a piece is 1,200,000. The average work done in a week by one machine was fifteen yards, or 60,000 flowers, or 1,800,000 stitches, and by comparing this with the work done by one person with the hand, it appears that the machine enabled one person to do the work of twenty-four persons.

Art of Breathing Flame.

One of the most ancient feats of magic was the art of breathing flame,—an art which even now excites the astonishment of the vulgar. During the insurrection of the slaves in Sicily in the second century before Christ, a Syrian named Eumus acquired by his knowledge the rank of their leader. In order to establish his influence over their minds, he pretended to possess miraculous power. When he wished to inspire his followers with courage, he breathed flames or sparks among them from his mouth, at the same time that he was rousing them by his eloquence. St. Jerome informs us that the Rabbi Barchochebas, who headed the Jews in their last revolt against Hadrian, made them believe that he was the Messiah, by vomiting flames from his mouth; and at a later period, the Emperor Constantius was thrown into a state of alarm when Valentinian informed him that he had seen one of the body guards breathing out fire and flames. We are not acquainted with the exact methods by which these effects were produced; but Florus informs us that Eunus filled a perforated nut shell with sulphur and fire, and having concealed it in his mouth, breathed gently through it while he was speaking. This art is performed more simply by the modern juggler. Having rolled together some flax or hemp, so as to form a ball the size of a walnut, he sets it on fire and allows it to burn till it is nearly consumed; he then rolls round it while burning some additional flax, and by these means the fire may be retained in it for a considerable time. At the commencement of his exhibition he introduces the ball into his mouth, and while he

breathes through it the fire is revived, and a number of burning sparks are projected from his mouth. These sparks are too feeble to do any harm, provided he inhales the air through his nostrils.

[TO BE CONTINUED.]

Meteorological Observations for February, 1833.

Month. Days.	Therm. Sun-rise.	Therm. 2 P.M.	Barometer. Sun rise.	Barometer. 2 P.M.	Dew point	Wind. Direction.	Wind. Force.	Water fallen in rain.	State of the weather, and Remarks.
			Inches.	Inches.				Inches.	
☉ 1	15°	29°	29.80	29.85	8°	NW.	Moderate.		Clear day.
2	15	30	30.00	30.00	14	W.	do.		Cloudy—clear.
3	16	32	29.93	29.93	10	W.	do.		Clear—cloudy.
4	19	36	30.00	30.00	11	W.	do.		Clear day.
5	21	32	.00	.00	20	NW. SW.	do.	0.40	Clear: light clds: snow in n't.
6	31	30	29.94	29.64	20	S. W.	do.		Cloudy—clear.
7	16	32	.76	.76	8	W.	Blustering.		Flying clouds—clear.
8	13	30	30.00	30.10	8	W.	Calm.		Clear day.
9	28	34	29.80	29.80	27	SSW. SW.	Moderate.		Clear day.
10	33	49	.90	.80	34	SE. E.	Calm.		Clear—hazy.
☾ 11	34	50	30.00	30.00	25	NE. SE.	Moderate.		Cloudy—hail.
12	30	32	29.70	29.70	38	E. SE.	do.	0.60	Fog and sleet—rain.
13	30	34	.70	.50	36	SE.	do.		Drizzle—rain.
14	26	32	.70	.90	30	WNW. W.	do.		Flying clouds—rain.
15	26	29	30.05	.94	26	E.	Blustering.	1.00	Cloudy—snow, 6¼ inches.
16	19	32	.10	30.15	23	SW. S.	Moderate.		Clear day.
17	26	40	29.95	29.85	33	SW. S.	do.		Cloudy—clear.
18	36	49	.45	.45	43	S.	Calm.	0.26	Heavy fog—flying clouds
19	43	49	.50	.50	40	WSW.	Moderate.		Rain—foggy.
⊗ 20	37	51	.62	.62	40	NW. W.	Blustering.		Cloudy—flying clouds.
21	32	36	.90	.90	9	WSW. S.	do.		Flying clouds—do.
22	24	43	30.00	.90	14	SW. W.	do.		Clear.
23	30	51	29.80	.80	27	SW. W.	Moderate.	0.40	do.
24	32	52	.70	.43	30	SE. S.	do.		Cldy: clear: snow in even. 10
25	13	22	.80	30.20	4	W.	Blustering.		Clear day. [A.M., therm. at 13
26	14	34	30.25	.90	18	SW. W.	do.		Cloudy—clear.
27	36	47	29.80	29.80	24	SE.	do.		Cloudy—snow.
☽ 28	22	24	30.00	30.00	7		Calm.	.30	
Mean	25.57	35.36	29.96	29.84	22.11			2.96	

	Thermometer.	Barometer.
Maximum height during the month,	52. on 24th.	30.25 on 26th.
Minimum do.	13. on 8th. & 25th.	29.43 on 24th.
Mean do.	30.42	29.85